



ARGENTINA

**MapBiomass General “Handbook” Algorithm Theoretical Basis
Document (ATBD)**

Collection 2

Version 1

September, 2025

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1. Introduction

1.1. Scope and content of the document

The objective of this document is to describe the theoretical basis, justification, and methods applied to produce annual maps of land use and land cover (LULC) of MapBiomass Argentina. This collection is the result of the integration of 6 working groups and includes maps from 1985 to 2024. This document describes the classification methods of Collection 2, the approach to integrating the regions, background information, and a general description of the method applied. The specific procedures applied in each region are in the appendices. The classification algorithms are available on MapBiomass Argentina GitHub.

1.2. Overview

The MapBiomass project started in Argentina in August 2023, aiming to contribute to understanding LCLU dynamics in Argentina. The MapBiomass initiative combines people, algorithms, satellite information and large-scale processing in a methodology that has revolutionized the operational large-scale generation of LULC maps. MapBiomass provides an ideal environment to enhance and share skills and abilities by collaborators from different locations and perspectives but with the mutual core value of learning by doing. Thanks to Google Earth Engine and open source technology it was possible to access and process large-scale datasets of satellite imagery such as the one generated by the MapBiomass project.

MapBiomass collections aim to contribute to developing a fast, reliable, collaborative, and low-cost method to process large-scale datasets and generate historical time series of land use and land cover annual maps (Annex 1). All data, classification maps, codes, statistics, and further analyses are openly accessible through the MapBiomass Platform. This is possible thanks to i) the Google Earth Engine platform, which provides access to data, image processing, standard algorithms, and the cloud computing facilities; ii) the freely available Landsat time-series dataset; and iii) the MapBiomass collaborative network of organizations and experts that share knowledge and mapping tools. MapBiomass maps are an evolving product and subsequent collections will be available in the future.

Collection 1: from 1998 through 2022 (launched in May 2024)

Collection 2: from 1985 through 2024 (launched in September 2025)

1.3. Products of the MapBiomias Argentina Collection 2

The products of the MapBiomias Argentina Collection 2 are the following:

- Country and regions maps (Chaco, Pampas, Atlantic Forest, Puna, Monte and High Andes, and Patagonia).
- Pre-Processed feature mosaics generated from Landsat archive collections (Landsat 5, Landsat 7, and Landsat 8).
- Image processing infrastructure and algorithms (scripts in Google Earth Engine and source code).
- LCLU transition statistics and spatial analysis with political territories, watersheds, protected areas and ecoregions.
- Quality assessment of the Landsat mosaics. Each scene may have a proportion of clouds and other interference. Thus, each pixel in a given year was qualified according to the number of available observations, varying from 0 to 23 observations per year. The quality assessment of the Landsat mosaics is available on the MapBiomias website.
- Annual and accumulated deforestation maps (from 1987 to 2024)
- Annual maps of secondary vegetation (from 1986 to 2024) and age of secondary vegetation maps.

1.3. Region of Interest

MapBiomias was created to produce LCLU annual maps for the entire Argentinian territory. The work was divided into 6 working groups: Chaco and Yungas, Pampas, Atlantic Forest, Puna, Monte and High Andes, and Patagonia and a cross-cutting theme Urban Areas (Fig. 1); each one with its own team and methodological particularities. The working groups have different experiences related to the project. In the case of Chaco, they are in collection 5. Pampas and Atlantic Forests teams are in their fourth collections. Puna, Monte and High Andes and Patagonia are in their second collection. The cross-cutting theme Urban areas is its first collection.

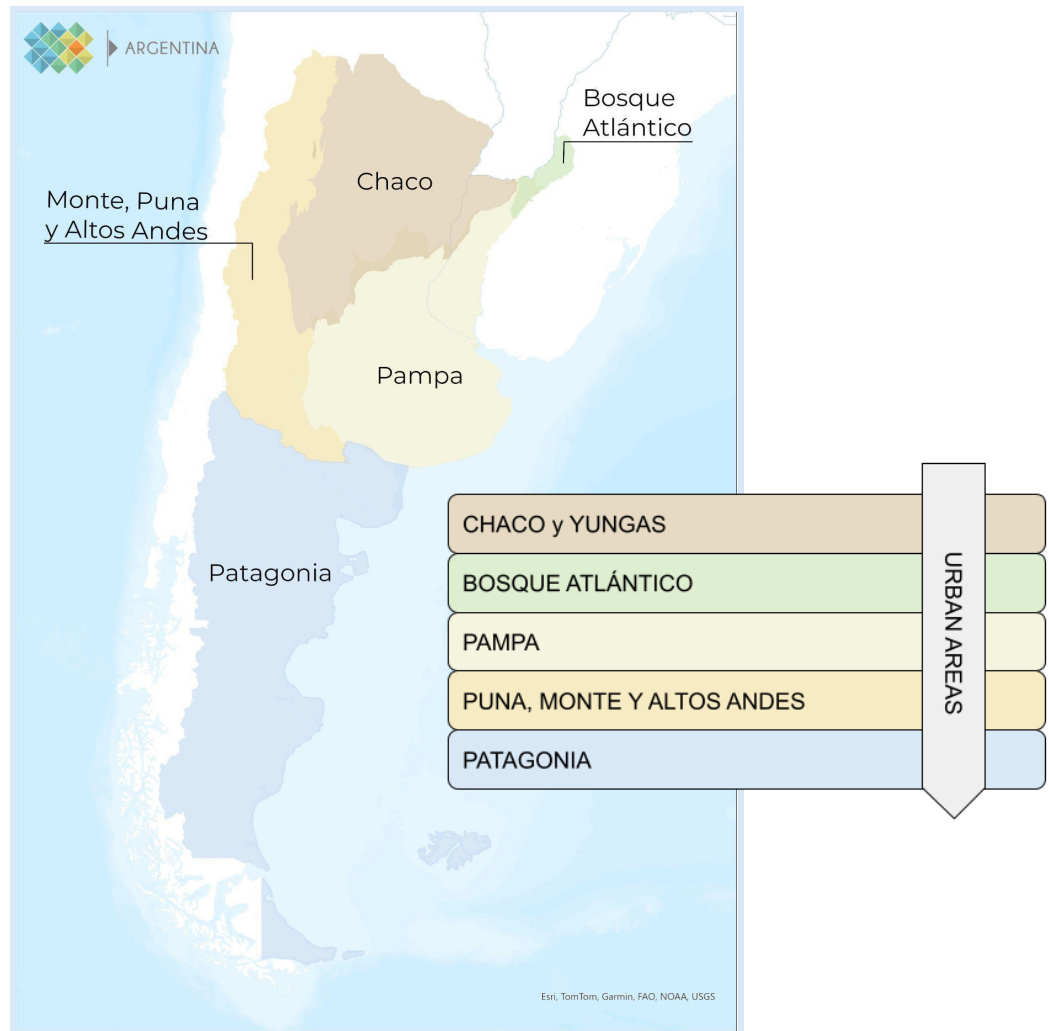


Figure 1. Scope of the different regions or working groups

2. Overview and Background Information

2.1. MapBiomass Global Network

We are a network of non-governmental organizations (NGOs), universities, research institutions and tech startups that produce and promote the use of qualified information to stewardship the land use and land cover in South America and other tropical and subtropical regions. As a network, we are committed to generating data, methods, tools and information to qualify the understanding, analysis and decision-making on conservation and sustainable management of continental natural resources.

The core product of MapBiomass is the Land Use & Land Cover Annual Maps, the Transitions Maps (the class differences between a selected period) and Statistics of

Land Use & Land Cover Change. There is also the Quality Map (based on the number of observations available related to the proportion of clouds and other interference). In this initiative, we are dedicated to developing the most updated, completed, and detailed time series of annual maps covering 1985 onwards to support and advance sustainable management and conservation of natural resources. However, the network is constantly expanding thematically, making specific modules for different topics available. For example: 1) Deforestation (annual data, frequency, and cumulative area); 2) Areas of secondary vegetation (age and annual data); 3) Infrastructure (with buffer zones for each type of infrastructure); 4) Information on pastures (classified by level of degradation); 5) Mining (artisanal/garimpo and industrial); 6) Irrigation; 7) Temporal analysis. The Argentine network will incorporate different modules as new collections are added.

The geospatial tech company Ecostage is responsible for the workspace/backend and dashboard/website/frontend of MapBiomass. The Federal University of Technology - Paraná oversees the data repositories of the MapBiomass Network. Google provides the cloud computing infrastructure that allows data processing and analysis through Google Earth Engine and storage through Google Cloud Storage.

2.2. MapBiomass Argentina Network

2.2.1 Origin

In Argentina, MapBiomass began in 2017 with the mapping of the Gran Chaco Americano, together with Bolivia and Paraguay. In 2019, it was extended to the Atlantic Forest and Pampa regions, together with Paraguay, Brazil, and Uruguay. In August 2023, the initiative was consolidated at the national level, with the aim of understanding the transformation processes occurring throughout the territory through the use of remote sensors, capitalizing on the experience of local groups in Argentina.

MapBiomass Argentina represents a qualitative leap in automating processes, generating and disseminating spatially explicit information about Argentine territory openly, freely, and at no cost. Its goal is to produce annual collections of land cover and land use maps for the entire country based on the local adaptation of the methodology developed in Brazil in 2015, which is periodically updated. Additionally, the platform provides users with codes, technical reports, and protocols used in generating information, ensuring process transparency. The platform offers statistics and graphics to facilitate access for different audiences.

2.2.3 Institutions

MapBiomass Argentina is a collaborative network of NGOs, Universities, and Research Institutes that is constantly growing. The network is a group of specialists in remote sensing, ecology, Geographic Information Systems (GIS), and programming from different ecoregions of the country, focused on producing annual collections of land cover and land use maps of Argentina since 1998.

Co-creators by regions and cross-cutting theme:

Chaco y Yungas:	- GeoSimple - Instituto Nacional de Tecnología Agropecuaria (INTA) - Fundación Vida Silvestre Argentina (FVS)
Bosque Atlántico:	- Facultad de Agronomía - UBA (FAUBA) - Fundación Vida Silvestre Argentina (FVS) - Instituto de Biología Subtropical (IBS) - Facultad de Ciencias Forestales - UNaM (FCF) - Laboratorio de Análisis Regional y Teledetección (CONICET-FAUBA)
Pampa:	- Instituto Nacional de Tecnología Agropecuaria (INTA) - CONICET - Instituto de Ciencias de la Tierra, Biodiversidad y Ambiente (ICBIA) UNRC-CONICET - Fundación Vida Silvestre Argentina (FVS)
Puna Monte y Altos Andes:	- Facultad de Agronomía - UBA (FAUBA) - Grupo de Estudios Ambientales - Instituto de Matemática Aplicada de San Luis (GEA - IMASL) - Instituto Argentino de Investigaciones de Zonas Áridas (IADIZA) - Natura Argentina - Instituto Nacional de Tecnología Agropecuaria (INTA) - Instituto de Investigaciones Fisiológicas y Ecológicas Vinculadas a la Agricultura (IFEVA/CONICET) - Laboratorio de Análisis Regional y Teledetección (LART-CONICET/FAUBA) - Fundación Vida Silvestre Argentina (FVS)
Patagonia:	- Fundación Vida Silvestre Argentina (FVS) - Instituto de Investigaciones en Biodiversidad y Medioambiente (INBIOMA) - Instituto de Investigaciones en Recursos Naturales, Agroecología y Desarrollo Rural (IRNAD- UNRN/CONICET)

	- Dirección de Bosques Rio Negro -Universidad Nacional del Comahue Bariloche (UNCO- CRUB) -Ministerio de Desarrollo Económico y Productivo -Centro de Investigación y Extensión Forestal Andino Patagónico(CIEFAP) -Secretaria de Ambiente.Tierra del Fuego
Urban areas:	-Universidad Nacional del Centro de la Provincia d Buenos Aires (UNICEN) -Fundación Vida Silvestre Argentina (FVS) -Instituto de Geografía, Historia y Ciencias Sociales (IGEHCs-CONICET/UNCPBA) -Instituto de Investigación para el Desarrollo Territorial y del Hábitat Humano (IIDTHH/UNNE-CONICET) -Universidad Nacional de General Sarmiento (UNGS) -Universidad Nacional de Cuyo (UNCuyo)

3. Methodological Description

3.1. Remote Sensing Data

The imagery dataset used in the MapBiomass project was obtained by the Landsat sensors Thematic Mapper (TM), Enhanced Thematic Mapper Plus (ETM+), and the Operational Land Imager and Thermal Infrared Sensor (OLI-TIRS), onboard of Landsat 5, Landsat 7, Landsat 8 and Landsat 9, respectively. The Landsat imagery collections with 30 meters pixel resolution were accessible via Google Earth Engine and produced by NASA and USGS. Specifically, the surface reflectance images from the 2 Tier 1 collection were used. This dataset contains atmospherically corrected surface reflectance and land surface temperature. These images contain 5 visible and near-infrared (VNIR) bands and 2 short-wave infrared (SWIR) bands processed to orthorectified surface reflectance, and one thermal infrared (TIR) band processed to orthorectified surface temperature. They also contain a QA band.

3.2 Google Earth Engine and MapBiomass Computer Applications

MapBiomass image processing is based on Google technology, which includes image processing in cloud computing infrastructure, programming with Javascript and

Python via Google Earth Engine, and data storage using Google Cloud Storage. Google defines Google Earth Engine as a platform for petabyte-scale scientific analysis and visualization of geospatial datasets, both for public benefit and for business and government users.

3.3 Overview of methodological process

The common methodological procedures applied in the different working groups or “regions” included several steps (Figure 2). The first step was to generate annual Landsat mosaics comprising specific temporal windows to optimize the spectral contrast and better discriminate the LCLU classes across the regions. The second step was to derive all feature space attributes from the Landsat bands to train one random forest classifier (feature space definition) for each year (Breiman, 2001). Then, yearly training samples were acquired in each region according to its information availability and statistical needs. The output of the random forest classifier is one LCLU map per year for the entire territory based on the training dataset of that year. Additionally, to improve the classification results, complementary samples were generated, defining georeferenced points of different classes by visual interpretation of historical satellite images (high and very high resolution images) and time series of vegetation indices. Based on the adjusted training data set, a supervised classification using the random forest algorithm was run. Spatial-temporal filters were applied over the classified data for noise removal and temporal stabilization. For more details of each step, see the ATDB from each region. Subsequently, the filtered LCLU maps of each region were hierarchically merged (integrated) based on a set of prevalence rules. The integration rules were set using expert knowledge and are described in Table 1. The transitions and statistics of each class were derived from the annual LCLU maps. The statistical analysis covered different spatial categories, such as biome, state, municipality, watershed, and protected areas.

Due to the lack of images in Patagonia from 1986 to 1997, this region could only be classified in 1985 and then from 1998 to 2024. No changes were detected for this region between 1986 and 1997.

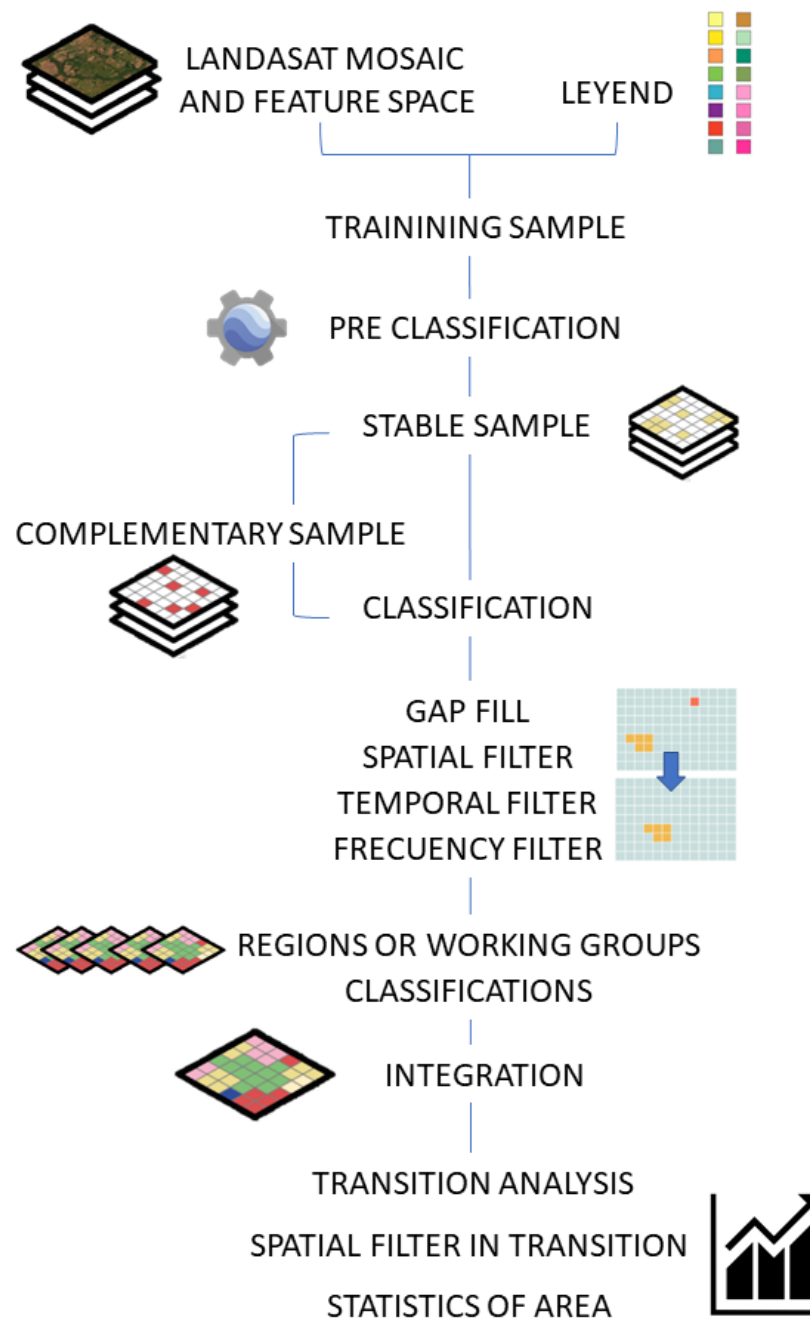


Figure 2. Overview of the classification process for MapBiomass Argentina.

3.4 Integration

In order to integrate the regions, the legends of the regional maps up to level 2 were used. For the overlapping areas, the min function was used, which prioritizes the pixel

with the lowest ID, giving priority to forest classes. The exception was the Atlantic forest region, which overlapped the rest. In some areas, exceptions were made by prioritizing a class over a region. In addition, the regional legends were readjusted, merging conceptually similar classes(Annex 2). Urban areas are added to the map at the end, taking precedence over all classes except water.

3.5 Map Legend

The classification for the MapBiomass Argentina initiative included 18 land use and land cover (LULC) classes (Table 1): Closed forest (3), Open forest (4), , Flooded forest(6), Closed shrublands (66), Open shrublands (77), Shrubs and herbaceous mosaic (63), Grassland (12), Flooded grasslands (12), Peatlands (73), Temporary crops (19), Perennial crops(36), Pasture (15), Forest Plantation (9), Agriculture and pasture mosaic (21), Urban Areas (24), Others non vegetated area (22), Ice and permanent snow (34), River, lake or ocean (33) and Not observed (27). A full description of the legend is described in the document Legend Description (Annex 3)

Table 2. Land cover and land use classes for MapBiomass Argentina - Collection 2.

COLLECTION 2 - CLASSES	Pixel id	Hexadecimal code	New color
1.Forests		#1f8d49	
1.1.Closed forests	3	#1f8d49	
1.2.Open forests	4	#7dc975	
1.3.Flooded forests	6	#026975	
2.Natural herbaceous and shrub vegetation		#d6bc74	
2.1.Closed shrublands	66	#a89358	
2.2.Open shrublands	77	#86b074	
2.3.Shrubs and herbaceous mosaic	63	#C7E0AB	
2.4.Grasslands	12	#d6bc74	
2.5.Flooded grasslands	11	#519799	
2.6.Peatlands	73	6fc179	
3.Agricultural and livestock area		#ffefc3	
3.1.Agriculture	18	#E974ED	
3.1.1.Temporary crops	19	#C27BA0	
3.4.Perennial crops	36	#d082de	
3.2.Pastures	15	#edde8e	
3.3.Forest plantations	9	#7a5900	
3.4.Agriculture and pasture mosaic	21	#ffefc3	
4. Non-vegetated area		#d4271e	
4.1.Urban areas	24	#d4271e	
4.2.Other non-vegetated areas	25	#db4d4f	
5. Water bodies		#2532e4	
5.1.Ice and permanent snow	34	#93dfe6	
5.2.Rivers, lakes or ocean	33	#2532e4	
6. Not observed	27	#ffffff	

3.6 Transition Maps

The pixel-by-pixel class differences between any two maps were computed for the following periods: (A) any consecutive years (e.g. 2001-2002); (B) five-year periods (e.g. 2000-2005); (C) all the years (1998-2022). The class transitions represent LCLU changes such as: Transitions from classes of agriculture or non-vegetated areas to forest cover or natural non-forest areas; Transitions that add water surface; Transitions that reduce water surface; Transitions with gain in forest plantation areas; Transitions from forest cover or natural non-forest areas to agriculture or non-vegetated areas; and Areas without transition or transitions that involve not observed areas or transitions between classes within level 1 of legend.

3.7. Spatial Filter on Transition Maps

A spatial filter similar to the one described in 3.6 section was applied in the transition maps. The target is to eliminate single pixels or streams of pixels in the border of different classes derived from the creation of transition maps. The general rules for this filter were: (i) pixels with only one neighbor pixel in the same transition class; (ii) streams of up to five pixels with two or one neighbor pixel in the same transition class.

3.8. Statistics

Zonal statistics of the mapped classes were calculated for different spatial units, such as the biomes, states, and municipalities, as well as watersheds and protected areas. A toolkit in the Google Earth Engine is available to upload user-defined polygons and download the LCLU maps.

4. References

- Breiman, L. 2001. Random forests. Machine learning, v. 45, n. 1, p. 5-32.
- USGS. Landsat Collection 1 Level 1 Product Definition. 2017. Available online: https://landsat.usgs.gov/sites/default/files/documents/LSDS-1656_Landsat_Level-1_Product_Collection_Definition.pdf

Annex 1: Classes of land cover and land use of Collections 1 to 2 of MapBiomass Argentina

1. Natural wooded vegetation
1.1. Closed woodland
1.2. Open woodland
1.3. Sparse woodland
1.4. Flooded woodland
2. Non-wooded natural formation
2.1. Non-wooded floodable vegetation
2.2. Grassland
2.3. Steppe
3. Agricultural and livestock area
3.1. Pasture
3.2. Agriculture
3.3. Forest plantation
3.4. Shrub plantation
3.5. Mosaic of agriculture and pasture
4. Non-vegetated area
5. Water body
5.1. River, lake or ocean
5.2. Ice and snow on surface
6. Not observed

1. Forests
1.1. Closed forests
1.2. Open forests
1.3. Flooded forests
2. Natural herbaceous and shrub vegetation
2.1. Closed shrublands
2.2. Open shrublands
2.3. Shrubs and herbaceous mosaic
2.4. Grasslands
2.5. Flooded grasslands
2.6. Peatlands
3. Agricultural and livestock area
3.1. Agriculture
3.1.1. Temporary crops
3.4. Perennial crops
3.2. Pastures
3.3. Forest plantations
3.4. Agriculture and pasture mosaic
4. Non-vegetated area
4.1. Urban areas
4.2. Other non-vegetated areas
5. Water bodies
5.1. Ice and permanent snow
5.2. Rivers, lakes or ocean
6. Not observed

Annex 2: Class equivalence between regions maps and the national map

Argentina	Chaco y Yungas	Bosque Atlántico	Pampas	Puna, Monte y Altos Andes	Patagonia
Bosques	-	-	-	-	-
Bosques Cerrados (ID=3)	Bosque cerrado(ID=3)	Bosque Cerrado (ID=3)	Bosque cerrado (ID=3)	Bosques Cerrados (ID=3)	Bosque (ID=3)
Bosques Abiertos(ID=4)	Bosque abierto (ID=4)		Bosque abierto (ID=4)	Bosques Abiertos (ID=4)	
Bosques Inundables (ID=6)	Bosque inundable (ID=6)		Bosque inundable (ID=6)		Leñosas Inundables (ID=6)
Vegetación natural herbácea y arbustiva	-		-	-	-
Arbustales cerrados (ID=66)	Arbustales cerrados (ID=66)		Arbustales cerrados (ID=66)	Arbustales cerrados (ID=66)	
Arbustales abiertos (ID= 77)	Arbustales abiertos (ID= 77)		Arbustales abiertos (ID= 77)	Arbustales abiertos (ID= 77)	Arbustal (ID=66)
Mosaico de arbustos y herbáceas (ID= 63)	Pastizal Disperso (ID=44); Leñosas Dispersas (ID=45)			Arbustales Dispersos (ID=45); Pastizales (ID=12)	Estepa (ID=63)
Herbaceas Inundables (ID= 11)	Pastizal inundable (ID=11)	Área húmeda natural no forestal (ID=11)	Pantano y Pastizal Inundable (ID=11)	Herbáceas inundables (ID=11)	Vegas/Mallines (ID=11)
Herbáceas (ID= 12)	Pastizal cerrado (ID=43); Pastizal abierto(ID=42)	Pastizal (ID=12)	Pastizal (ID=12)	Pastizales (ID=12)	Pastizales (ID=12)
Turberas (ID= 73)					Turberas (ID=75)

Agropecuario	-	-	-	-	-
Agricultura					
Cultivos temporarios (ID= 19)	Cultivos anuales (ID=19)	Cultivos anuales (ID=19)	Cultivos anuales (ID=12)		
Cultivos perennes (ID= 35)	Cultivos Arbustivos (ID=36)	Té (ID=65), Otros cultivos perennes (ID=48)	Cultivos arbustivos (ID=36)		
Pasturas (ID= 15)	Pasturas (ID=15)	Pasturas (ID=15)	Pasturas (ID=15)		
Silvicultura (ID= 9)	Plantación Forestal (ID=9)	Plantaciones Forestales (ID=9)	Sivicultura (ID=9)	Leñosas cultivadas (ID=9)	Plantaciones Forestales (ID=9)
Mosaico de usos (ID= 21)				Mosaico de Usos (ID=21)	Mosaico de Usos (ID=21)
Área no vegetada	-	-	-	-	-
Areas Urbanas (ID= 24)	Transversal (ID=24)				
Otras áreas no vegetadas (ID= 25)	Playas y dunas (ID=23);Salares (ID=32); Otras áreas no vegetadas (ID=25)	Áreas no vegetadas (ID=22)	Áreas no vegetadas (ID=22)	Área no vegetada (ID=25)	Roca alto andina (ID=29); Desiertos y Eriales (ID=25);
Cuerpo de agua, nieve o hielo	-	-	-	-	
Ríos, lagunas, lagos y océano (ID= 26)	Rios, lago y océano (ID=26)	Rios, lago y océano (ID=33)	Rios, lago y océano (ID=33)	Ríos, lagunas y lagos (ID=33)	Ríos, lago y océano (ID=3)
Hielo en superficie y nieve permanente (ID= 34)				Hielo y nieve en superficie (ID=34)	Glaciar / Nieve y hielo (ID=34)
No Observado (ID= 27)				No Observado (ID=27)	No Observado (ID=27)

Annex 3:											
				DESCRIPTION OF THE CLASSES USED IN THE LEGEND OF MAPBIOMAS ARGENTINA COLLECTION 2							
Class Level 1	Class Level 2	Class Level 3	Region	Description	FAO equiv	IPCC equiv	LC INTA equiv	UMSEF equiv	Google earth Photo	Example Photo	Landsat Image
Forests	Closed Forests	Chaco y Yungas		Areas with natural vegetation formed by trees with canopy cover equal to or greater than 65%.	FEP,FEM,FEY, FDP,FDM,FDY, FSP,FSM,FSY	Forest land	2.1.1	TF	GE_VNL_LC_CH.p ng	Bosque chaqueño_PNCop o_Lizarraga	LA_VNL_LC_CH.p ng
		Pampas		Natural tree vegetation, with crowns that touch or are slightly separated, with coverage greater than 65%.					Pampa_BosqueCerrado_AltaResolucion.png	Pampa_BosqueCerrado_Paisaje_Su klje.png	Pampa_BosqueCerrado_Landsat.png
		Atlantic Forest		Natural vegetation areas formed by trees with coverage equal to or greater than 65%.					BA_LeñosaCerrado.png	BA_LeñosaCerrado_SV.png	BA_LeñosaCerrado_L.jpeg
		Monte, Puna and Altos Andes		Areas with natural vegetation dominated by trees with coverage equal to or greater than 65%.					PMAA_Leñosas_Cerradas.png	PMAA_Leñosas_Cerradas_SV.png	PMYAA_Bosque_Landsat.png
		Patagonia		Areas with natural vegetation formed by trees with coverage equal to or greater than 30%. Dense tree coverage, with evergreen (coihue, cypress, larch) or deciduous (lenga, raulí, pellín oak, valley bottom ñirantales, araucaria) foliage and their combinations.					PAT_BosqueCerrado.png	PAT_BosqueCerrado_SV.png	PAT_Lcerrada_Landsat.png
		Chaco y Yungas		Areas with natural vegetation formed by trees with coverage equal to or greater than 20% and less than 65%.					CH_LABierta.png	CH_LABierta_SV.png	CH_LABierta_Landsat.png
	Open Forests	Pampas		Natural tree vegetation with discontinuous crowns, with coverage greater than 20% and less than 65%. Includes open sclerophytic forest (Caldenal).	FEP,FEM,FEY, FDP,FDM,FDY, FSP,FSM,FSY	Forest land	2.1.2	TF	Pampa_BosqueAbierto_AltaResolucion.png	Pampa_BosqueAbierto_Paisaje_GuerraLara.jpg	Pampa_BosqueAbierto_Landsat.png
		Monte, Puna and Altos Andes		Areas with natural vegetation dominated by trees with coverage equal to or greater than 20% and less than 65%.					PMYAA_BosqueAbierto_GE.png	PMYAA_BosqueAbierto.png	PMYAA_BosqueAbierto_Landsat.png
		Chaco y Yungas		Transitional areas between pure terrestrial and aquatic systems, where the water table is generally at or near the surface (flooded areas). The natural vegetation cover formed by trees, shrubs or a mixture of both is significantly influenced by water and/or depends on flooding.					CH_Linund.png	bch_leñosas_inundables_Gisela_Córdoba.JPG	CH_Linund_Landsat.png
	Flooded Forests	Pampas		Transitional areas between pure terrestrial and aquatic systems, where the water table is generally at or near the surface (flooded areas). The natural vegetation cover formed by trees, shrubs or a mixture of both is significantly influenced by water and/or depends on flooding.	FEP,FEM,FEY, FDP,FDM,FDY, FSP,FSM,FSY	Forest land	3.1	TF	Pampa_BosqueInundable.png	Pampa_BosquesInundables_GE.png	Pampa_BosquesInundables_Landsat.png
		Patagonia		Mainly riparian forests. Transitional areas between pure terrestrial and aquatic systems, where the water table is generally at or near the surface (flooded areas). The natural vegetation cover formed by trees, shrubs or a mixture of both is significantly influenced by water and/or depends on flooding.					Patagonia_LeñosaInundable.png	Pat_bosqueinundable_GE.png	Pat_bosqueinundable_Landsat.png
	Closed Shrublands	Chaco y Yungas		Areas with natural vegetation dominated by tall shrubs (greater than one meter and less than three), with coverage equal to or greater than 65%.	WS	Forest land/ Grassland	2.2.1	OTF	Chaco_ArbustalesCerrados.png	Chaco_ArbustalesCerrados_GE.png	Chaco_ArbustalesCerrado_Landsat.png
		Pampas		Natural shrub vegetation, with crowns that touch or are slightly separated, with coverage greater than 65%.					Pampa_ArbustalCerrado_GE.png	Pampa_ArbustalCerrado.png	Pampa_ArbustalCerrado_Landsat.png
		Monte, Puna and Altos Andes		Areas with natural vegetation dominated by shrubs with coverage equal to or greater than 65%.					Puna,MonteYAltosAndes_ArbustalesCerrados.png	Puna,MonteYAltosAndes_ArbustalesCerrados_GE.png	PMAA_ArbustalCerrado_Landsat.png
	Open Shrublands	Chaco		Areas with natural vegetation dominated by tall shrubs (greater than one meter and less than three), with coverage equal to or greater than 20% and less than 65%.	WS	Forest land/ Grassland	2.2.2	OTF	Chaco_ArbustalAbierto.png	Chaco_ArbustalAbierto_GEE.png	PMAA_ArbustalesAbiertos_Landsat.png
		Pampas		Natural shrub vegetation with discontinuous crowns, with coverage greater than 20% and less than 65%.					Pampa_ArbustalAbierto_Landsat.png	Pampa_ArbustalAbierto.png	Pampa_ArbustalAbierto_Landsat.png
		Monte, Puna and Altos Andes		Areas with natural vegetation dominated by shrubs with coverage equal to or greater than 20% and less than 65%.					PMAA_LeñosasAbiertas.png	PMAA_LeñosasAbiertas_SV.png	PMAA_LAbiertas_Landsat.png
		Patagonia		Natural plant cover with shrub predominance. This class is composed of woody shrub formations. Does not include valley bottom scrublands in forests and shrub steppes.					PAT_Arbustales_GE.png	PAT_Arbustales.png	PAT_Arbustal_Landsat.png

[illegible]