*Copernicus Initial Operations 2011-2013 - Land Monitoring Service Local Component: Riparian Zones*

European Environment Agency
Specific Contract No. 3436/B2015/R0-GIO/EEA.56131
Implementing Framework Service Contract No. EEA/MDI/14/001

# RZ PRODUCT SPECIFICATIONS (short version)

**September 2015**

**submitted by:**

**in collaboration with:**

**submitted to:**

European Environment Agency

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# Abbreviations & Acronyms

| | |
|---|---|
| AoI | Area of Interest |
| CLC | CORINE Land Cover |
| DOM | Départements et regions d'outre-mer |
| DRZA | Delineation of Actual Riparian Zones |
| DRZO | Delineation of Observable Riparian Zones |
| DRZP | Delineation of Potential Riparian Zones |
| DU | Delivery Unit |
| DWH | Data Warehouse |
| ECRINS | European Catchments and Rivers Network System |
| EEA | European Environment Agency |
| EO | Earth Observation |
| EPSG | European Petroleum Survey Group Geodesy |
| ESA | European Space Agency |
| ETRS | European Terrestrial Reference System |
| EU | European Union |
| FAO | Food and Agriculture Organization of the United Nations |
| FID | Feature Identifier |
| GLE | Green Linear Element |
| GCS | Geographic Coordinate System |
| GIO | GMES Initial Operations |
| HA | Hectare |
| HR | High Resolution |
| HRG | High Resolution Geometrical |
| HRL | High Resolution Layer |
| HWSD | Harmonized World Soil Database |
| ID | Identifier |
| INSPIRE | Infrastructure for Spatial Information in Europe |
| ISO | International Organization for Standardization |
| JRC | Joint Research Centre |
| LAEA | Lambert Azimuthal Equal-Area |
| MAES | Mapping and Assessment of Ecosystems and their Services |
| MMU | Minimum Mapping Unit |
| MMW | Minimum Mapping Width |
| MSGI | Metadata Standard for Geographic Information |
| NDVI | Normalised Difference Vegetation Index |
| NDWI | Normalised Difference Water Index |
| OSM | Open Street Map |
| RMSE | Root Mean Square Error |
| RZ | Riparian Zones |
| TC | Technical Committee |
| TCD | Tree Cover Density |
| TIF | Tagged Image File Format |
| VHR | Very High Resolution |
| WKID | Well-known ID |
| XML | Extensible Markup Language |

# 1. Product File Nomenclature

A product file naming convention has been developed, based on the standards established between EEA and the HRL mapping consortia in the frame of the GIO-Land HRL project. The product file name shall be composed of the following name constituents:

THEME_DELIVERY UNIT ID_PRODUCT_VERSION

*with the following detailed meanings:*

THEME (3-letter abbreviation)

'rpz' = "Riparian Zones"

DELIVERY UNIT ID (6-letter)

'DU001A' = "Delivery Unit DU001A" (A = All; full delivery)
'DU002A' = "Delivery Unit DU002A" (A = All; full delivery)
'DU003B' = "Delivery Unit DU003B" (B - Z = partial delivery)

*Please note: Due to data situation and prioritisation, partial deliveries might become necessary. Several partial deliveries (e.g. DU008B and DU008C) form a full delivery (e.g. DU008B + DU008C → DU008A).*

PRODUCT (3/4-letter abbreviation)

'lclu' = "Land Cover / Land Use Classification"
'drzp' = "Delineation of Potential Riparian Zones"
'drzo' = "Delineation of Observable Riparian Zones"
'drza' = "Delineation of Actual Riparian Zones"
'gle' = "Green Linear Elements"

VERSION

'v01' = "Version 1"
'v02' = "Version 2"

Example: rpz_DU008B_lclu_v01.shp

# 2. Riparian Zones Delivery Units

RZ products have been produced for the whole EEA-39 (without Azores, Canarias and French DOMs) plus Andorra and the Vatican City (Monaco, San Marino, Gibraltar, the Channel Islands and the Isle of Man are excluded) and delivered on a Delivery Unit level. The hydrologically meaningful Delivery Units are based on aggregated sub-basins of EEA's European Catchment and Rivers Network System (ECRINS v1.1) and are presented in Figure 1. Delivery Units, corresponding RZ AoI area and the associated catchments are provided in Table 1.

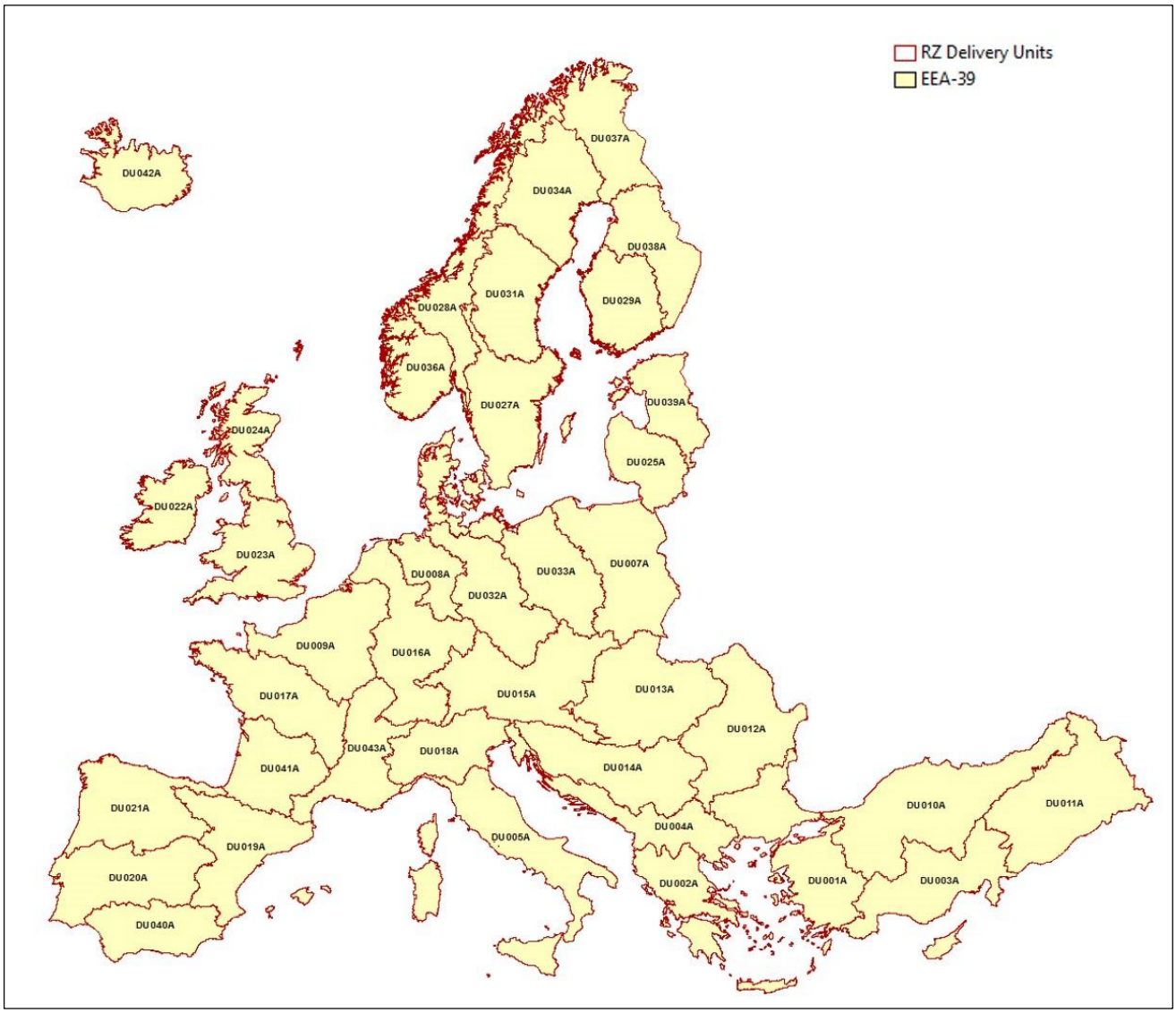


**Figure 1: The 43 Riparian Zones Delivery Units (based on ECRINS v1.1)**

**Table 1: Riparian Zones Delivery Units**

| Riparian Zones Delivery Units | | | |
|---|---|---|---|
| **No.** | **DU ID** | **Catchment Name(s) per Unit** | **RZ AoI Area v07 [km²]** |
| 1 | DU001A | Aegean Islands, Black Sea Basin District, Turkey_West | 10,366.28 |
| 2 | DU002A | Attica, Crete, Eastern Peloponnese, Eastern Sterea Ellada, Seman, Thessalia, Western Macedonia, Western Sterea Ellada | 9,194.40 |
| 3 | DU003A | Turkey_South, Cyprus | 6,950.23 |
| 4 | DU004A | Adriatic Sea coastal catchments and small basins, Central Macedonia, Crni Drim / Drin, Drini i Zi, Neretva, North Adriatic, West Aegean Region Basin District | 10,445.75 |
| 5 | DU005A | Middle Appenines, Serchio, Sicily, Southern Appenines | 15,915.40 |
| 6 | DU006A | Balearic Islands, Corsica, Sardinia | 2,793.79 |
| 7 | DU007A | Dniestr, Pregolya, Vistula | 17,318.66 |
| 8 | DU008A | Ems, Weser | 7,903.63 |
| 9 | DU009A | Meuse, Scheldt (Brussels Area), Seine | 12,629.33 |
| 10 | DU010A | Turkey_North | 10,662.95 |
| 11 | DU011A | Turkey_East | 12,961.93 |
| 12 | DU012A | Danube_East | 24,664.47 |
| 13 | DU013A | Danube_North | 40,960.98 |
| 14 | DU014A | Danube_South | 19,848.79 |
| 15 | DU015A | Danube_West | 27,728.88 |
| 16 | DU016A | Rhine | 23,107.68 |
| 17 | DU017A | Loire, Brittany and Vendee coastal waters | 11,675.54 |
| 18 | DU018A | Eastern Alps, Po Basin | 22,537.67 |
| 19 | DU019A | Ebro, Internal Basins of Catalonia, Jucar | 12,801.42 |
| 20 | DU020A | Algarve Basins, Guadiana, Sado and Mira, Tagus and Western Basins | 14,683.42 |
| 21 | DU021A | Basque County internal basins, Cavado, Ave and Leca, Douro, Galician Coast, Minho and Lima, Vouga, Mondego and Lis | 16,323.99 |
| 22 | DU022A | Eastern, IE South Eastern, IE South Western, Neagh Bann, North Eastern, North Western, Shannon | 5,942.54 |
| 23 | DU023A | Anglian, Dee, Humber, North West, Thames, UK South East, UK South West, Western Wales | 8,410.12 |
| 24 | DU024A | Northumbria, Scotland, Solway Tweed | 7,585.44 |
| 25 | DU025A | Lielupe, Nemunas, Venta | 5,586.02 |
| 26 | DU026A | Schlei/Trave, Vidaa-Krusaa, Warnow/Peene | 1,800.37 |
| 27 | DU027A | North Baltic, Skagerrak and Kattegat, South Baltic | 25,475.64 |
| 28 | DU028A | Glomma, Moere and Romsdal, Troendelag | 7,529.90 |
| 29 | DU029A | Kokemoenjoki-Archipelago Sea-Bothnian Sea, Kymijoki-Gulf of Finland | 13,968.23 |
| 30 | DU030A | Nordland, Troms | 3,257.63 |
| 31 | DU031A | Bothnian Sea | 14,988.76 |
| 32 | DU032A | Elbe, Elbe coastal catchments | 16,539.70 |
| 33 | DU033A | Ucker | 12,260.54 |
| 34 | DU034A | Tornionjoki (Finnish part) | 17,331.64 |
| 35 | DU035A | Jutland and Funen, Zealand | 725.45 |
| 36 | DU036A | SE South West, West Bay | 7,855.97 |
| 37 | DU037A | Finnmark, Kemijoki, Teno-, Nootom- and Paatsjoki (Finnish part) | 9,948.95 |
| 38 | DU038A | Oulujoki-Iijoki, Vuoksi | 20,701.62 |
| 39 | DU039A | Daugava, East Estonia, Gauja, West Estonia | 6,566.04 |
| 40 | DU040A | Andalusia Atlantic Basins, Andalusia Mediterranean Basins | 8,901.54 |
| 41 | DU041A | Adour, Garonne, Dordogne, Charente and coastal waters of aquitania | 10,253.98 |
| 42 | DU042A | Iceland | 3,366.38 |
| 43 | DU043A | Rhone and Coastal Mediterranean | 16,186.62 |

# 3. Product Specifications

## 3.1 Specifications of Land Cover and Land Use Product

| Product Specifications of the Land Cover and Land Use Product |
|---|
| **Product Title / Content** |
| Riparian Zones: Land Cover and Land Use Classification within buffer zone of selected rivers |
| **Product Short Name** |
| LCLU |
| **Product Definition** |
| The Riparian LC/LU product is providing a detailed LC/LU dataset for areas along a buffer zone of selected rivers covering EEA-39. The Area of Interest (AoI) has a toatal area of ca. 556,600 km² and comprises of a merge of selected rivers (Strahler level 3 to 8) with different buffer sizes as a function of the Strahler level, derived from the EU-HYDRO dataset and the area of the Pan-EU Flood Hazard Map produced by JRC for the 100-year return period (Alfieri et. al. 2013) with 100m grid size, supplemented by manual amendments and modelled *Potential Riparian Zones*. All riparian zones of lakes which are connected to the river system, i.e., which are crossed by a river (e.g. Lake Constance) are considered as part of the Riparian Zones AoI.<br>The LC/LU classification scheme is following the MAES nomenclature (Level 1 to Level 4) and provides up to 85 thematic classes with a Minimum Mapping Unit of 0.5 ha and a Minimum Mapping Width of 10m.<br>The mapping of land cover and land use along a buffer zone of selected areas has as its main objective, to support the Mapping and Assessment of Ecosystems and their Services (MAES), as part of the EU Biodiversity Strategy to 2020. |
| **Input Data Sources** |
| 1.) Final Riparian Zones AoI *rpz_europe_rz_aoi_v07.shp*<br>2.) DWH_MG2b_CORE_03 - Optical VHR2 coverage over EU 2011-2013 and Riparian zones<br>• ca. 3,600x SPOT-5 HRG (2.5m) & ca. 400x SPOT-6 (1.5m)<br>• Additional CORE_03 gap-filling VHR2 data that were made available in the course of the project<br>Additional data:<br>• CLC 2006/2012<br>• Urban Atlas 2006/2012<br>• GIO HR Layers Imperviousness Degree and Tree Cover Density<br>• DWH_MG2_CORE_01 Coverage 2 (RapidEye, 5m)<br>• National ortho-photo WMS services, GoogleEarth Pro, Bing Maps<br>• Numerous additional reference and in-situ data sources |
| **Methodology** |
| Semi-automatic LC/LU classification of 1.5m SPOT-6, 2.0m Pléiades and 2.5m SPOT-5 HRG satellite data from the DWH_MG2b_CORE_03 dataset and computer assisted visual refinement. Visual interpretation of LC/LU classes follows the pre-defined nomenclature on the basis of MAES typology of ecosystems (Level 1 to Level 4) and Corine Land Cover. Subsequently intersection of classification results with additional data (CLC 2006/CLC 2012, GIO HRL Imperviousness Degree, GIO HRL Tree Cover Density, Urban Atlas 2006/2012). |

**Geographic Coverage**

EEA-39 (without Azores, Canarias and French DOMs) plus Andorra and Vatican City: ca. 5,825,500 km²

*Geographic Bounding Box*

| | | |
|---|---|---|
| | *North* **71.185** | |
| *West* **-24.532** | | *East* **44.819** |
| | *South* **34.562** | |

**Temporal Reference**

2010 – 2014

**Geometric Resolution / Equivalent Scale**

1:10,000

**Minimum Mapping Unit**

0.5 ha

**Minimum Mapping Length**

N/A

**Minimum Mapping Width**

10m

**Coordinate Reference System**

| | |
|---|---|
| ETRS_1989_LAEA<br>WKID: 3035 Authority: EPSG<br>Projection: Lambert_Azimuthal_Equal_Area<br>false_easting: 4321000,0<br>false_northing: 3210000,0<br>central_meridian: 10,0<br>latitude_of_origin: 52,0<br>Linear Unit: Meter (1,0) | Geographic Coordinate System: GCS_ETRS_1989<br>Angular Unit: Degree (0,0174532925199433)<br>Prime Meridian: Greenwich (0,0)<br>Datum: D_ETRS_1989<br>Spheroid: GRS_1980<br>Semimajor Axis: 6378137,0<br>Semiminor Axis: 6356752,314140356<br>Inverse Flattening: 298,257222101 |

**Geometric Accuracy (positioning scale)**

< 5m RMSE (according to ortho-rectified DWH CORE_03 satellite imagery delivered by ESA).
In case of gap-filling with HR data, a locally lower geometric accuracy may result.

**Thematic Accuracy (in %)**

Target Overall Accuracy: ≥ 85%

**Accuracy Assessment Approach**

Stratified Random Point Sampling using LUCAS 2012 database

**Data Type**

Vector

**Delivery Format**

ESRI Shapefile Format (*.SHP)

**Metadata**

ISO TC 211 compliant according to INSPIRE metadata standards in XML format

| Class Coding / Attribution | | | |
|---|---|---|---|
| **Field** | **Description** | **Type** | **Value(s)** |
| [FID] | Dynamic Feature Identifier | Object ID | 0 to 2,147,483,647 |
| [Shape] | Polygon (default by ESRI) | Geometry | Polygon |
| [ID] | Unique Identifier of the feature geometry | Long, Precision 6 | 1 to 2,147,483,647 |
| [DU_ID] | Unique Identifier of the Riparian Zones delivery unit | String, Length 10 | DU001A to DU043A |
| [MAES_1] | Class code of MAES Level 1 | Long, Precision 6 | 1 to 10 |
| [MAES_2] | Class code of MAES Level 2 | Long, Precision 6 | 11 to 101 |
| [MAES_3] | Class code of MAES Level 3 | Long, Precision 6 | 111 to 1011 |
| [MAES_4] | Class code of MAES Level 4 | Long, Precision 6 | 1111 to 10111 |
| [TCD] | Tree Cover Density in % | String, Length 25 | TCD ≥ 10 – 30%<br>TCD > 30 – 50%<br>TCD > 50 – 80%<br>TCD > 80 – 100% |
| [UA] | Urban Atlas 2006/2012 flag | String, Length 10 | UA2006<br>UA2012<br>NoData |
| [AREA_HA] | Area in hectare [ha] | Double | 0.001 to 1.8E308 |
| [NODATA] | Unclassifiable area due to clouds, shadows, snow, haze or missing data (no satellite data available) | Long, Precision 6 | 1 |
| [COMMENT] | Comment field for additional information | String, Length 254 | Free text |

## 3.2 Specifications of Potential Riparian Zones

| Product Specifications of Potential Riparian Zone Products |
|---|
| **Product Title / Content** |
| Riparian Zones: Delineation of Potential Riparian Zones |
| **Product Short Name** |
| DRZP |
| **Product Definition** |
| The Potential Riparian Zone is a modelled area with a high probability to host riparian features. |
| **Input Data Sources** |
| 1.) EU-DEM 25m<br>2.) Water mask from:<br>• Riparian Zone LC/LU product<br>• EU-HYDRO (Image2006 based version)<br>• Open Street Map (OSM)<br>• Semi-automatic derived water mask from CORE_03 data<br>3.) JRC Flood Hazard Risk Maps 20y/50y/100y/200y/500y (100m)<br>4.) Harmonized World Soil Database (HWSD) |
| **Methodology** |
| Spatial Modelling of the *Potential Riparian Zone*, which indicates the disposition to host riparian features. The calculation is based on the stratification of different hydrological and geomorphological parameters. These parameters are derived from the input datasets and are weighted differently dependent on their significance and quality. The resulting membership degree of each input parameter is finally combined into a single membership degree expressing the likelihood of an area to be part of a Potential Riparian Zone. |
| **Geographic Coverage** |
| EEA-39 (without Azores, Canarias and French DOMs) plus Andorra and Vatican City: ca. 5,825,500 km² |

*Geographic Bounding Box*

| | | |
|---|---|---|
| | *North* **71.185** | |
| *West* **-24.532** | | *East* **44.819** |
| | *South* **34.562** | |

| |
|---|
| **Temporal Reference** |
| 2010 – 2014 |
| **Geometric Resolution / Equivalent Scale** |
| 1.) Thematic Raster: 25m<br>2.) Vector: 1:50,000 |
| **Minimum Mapping Unit** |
| 1.) Thematic Raster: 625 m² (pixel-based)<br>2.) Vector: 50 ha |
| **Minimum Mapping Length** |
| N/A |
| **Minimum Mapping Width** |
| N/A |

| **Coordinate Reference System** | |
|---|---|
| ETRS_1989_LAEA<br>WKID: 3035 Authority: EPSG<br>Projection: Lambert_Azimuthal_Equal_Area<br>false_easting: 4321000,0<br>false_northing: 3210000,0<br>central_meridian: 10,0<br>latitude_of_origin: 52,0<br>Linear Unit: Meter (1,0) | Geographic Coordinate System: GCS_ETRS_1989<br>Angular Unit: Degree (0,0174532925199433)<br>Prime Meridian: Greenwich (0,0)<br>Datum: D_ETRS_1989<br>Spheroid: GRS_1980<br>Semimajor Axis: 6378137,0<br>Semiminor Axis: 6356752,314140356<br>Inverse Flattening: 298,257222101 |
| **Geometric Accuracy (positioning scale)** | |
| N/A | |
| **Thematic Accuracy (in %)** | |
| N/A | |
| **Accuracy Assessment Approach** | |
| Qualitative Expert Assessment | |
| **Data Type** | |
| 1.) Thematic Raster; 8bit unsigned integer in LZW compression<br>2.) Vector | |
| **Delivery Format** | |
| 1.) Thematic Raster (*.TIF)<br>2.) ESRI Shapefile Format (*.SHP) | |
| **Metadata** | |
| ISO TC 211 compliant according to INSPIRE metadata standards in XML format | |
| **Class Coding / Attribution of Thematic Raster** | |

| Field | Description | Type | Value(s) |
|---|---|---|---|
| [OID] | Dynamic Object Identifier | Object ID | 0 to 2,147,483,647 |
| [DU_ID] | Unique Identifier of the Riparian Zones delivery unit | String, Length 10 | DU001A to DU043A |
| [DRZP_CODE] | Class code (membership) of Potential Riparian Zone | Long, Precision 9 | 0 to 100 |
| [DRZP_DESCR] | Membership degree of Potential Riparian Zone in percent [%] | String, Length 254 | 0-100% membership degree of Potential Riparian Zone |
| [COUNT] | Number of pixels per class | Double | 1 to 1.8E308 |
| [AREA_SQKM] | Area in square kilometres [km²] | Double | 0.000625 to 1.8E308 |
| [NODATA] | Unclassifiable area due to clouds, shadows, snow, haze or missing data (no satellite data available) | Short, Precision 4 | 999<br>*otherwise 0* |

| Class Coding / Attribution of Vector Dataset | | | |
|---|---|---|---|
| **Field** | **Description** | **Type** | **Value(s)** |
| [FID] | Dynamic Feature Identifier | Object ID | 0 to 2,147,483,647 |
| [Shape] | Polygon (default by ESRI) | Geometry | Polygon |
| [ID] | Unique Identifier of the feature geometry | Long, Precision 9 | 1 to 2,147,483,647 |
| [DU_ID] | Unique Identifier of the Riparian Zones delivery unit | String, Length 10 | DU001A to DU043A |
| [DRZP_CODE] | Class code of Potential Riparian Zones Extent | Long, Precision 9 | 1 |
| [DRZP_DESCR] | Potential Riparian Zones Extent (≥ 50% membership degree of Potential Riparian Zone) | String, Length 254 | Potential Riparian Zones Extent (≥ 50% membership degree of Potential Riparian Zone) |
| [AREA_SQKM] | Area in square kilometres [km²] | Double | 0.000625 to 1.8E308 |
| [NODATA] | Unclassifiable area due to clouds, shadows, snow, haze or missing data (no satellite data available) | Short, Precision 4 | 999<br>*otherwise 0* |
| [COMMENT] | Comment field for additional information | String, Length 254 | Free text |

## 3.3 Specifications of Observable Riparian Zones

| Product Specifications of Observable Riparian Zones Products |
|---|
| **Product Title / Content** |
| Riparian Zones: Delineation of Observable Riparian Zones |
| **Product Short Name** |
| DRZO |
| **Product Definition** |
| The Observable Riparian Zone shows the observed extent of riparian features (often riparian vegetation, but including e.g. also riverbanks). |
| **Input Data Sources** |
| 1.) Riparian Zone LC/LU product<br>2.) NDVI derived from Landsat-8 data from 2013/2014<br>3.) NDWI derived from Landsat-8 data from 2013/2014 |
| **Methodology** |
| Spatial Modelling of the *Observable Riparian Zone*. The actually observed (recent) Riparian Zone (often riparian vegetation, but including e.g. also riverbanks) is based on layers of vegetation, water, soil and built up observation, based on remote sensing data and a very detailed LC/LU classification. Additionally, indicators for vegetation wetness, vegetation vigour and leaf water content provide evidence of riparian features. All relevant datasets are included in a segmentation approach and the resulting membership degrees of all datasets are combined to a single membership degree expressing the probability to encounter riparian features on ground. |
| **Geographic Coverage** |
| EEA-39 (without Azores, Canarias and French DOMs) plus Andorra and Vatican City: ca. 5,825,500 km² |

*Geographic Bounding Box*

| | | |
|---|---|---|
| | *North* **71.185** | |
| *West* **-24.532** | | *East* **44.819** |
| | *South* **34.562** | |

| |
|---|
| **Temporal Reference** |
| 2010 – 2014 |
| **Geometric Resolution / Equivalent Scale** |
| 1.) Thematic Raster: 25m<br>2.) Vector: 1:50,000 |
| **Minimum Mapping Unit** |
| 1.) Thematic Raster: 625 m² (pixel-based)<br>2.) Vector: 625 m² |
| **Minimum Mapping Length** |
| N/A |
| **Minimum Mapping Width** |
| N/A |

| **Coordinate Reference System** | |
|---|---|
| ETRS_1989_LAEA<br>WKID: 3035 Authority: EPSG<br>Projection: Lambert_Azimuthal_Equal_Area<br>false_easting: 4321000,0<br>false_northing: 3210000,0<br>central_meridian: 10,0<br>latitude_of_origin: 52,0<br>Linear Unit: Meter (1,0) | Geographic Coordinate System: GCS_ETRS_1989<br>Angular Unit: Degree (0,0174532925199433)<br>Prime Meridian: Greenwich (0,0)<br>Datum: D_ETRS_1989<br>Spheroid: GRS_1980<br>Semimajor Axis: 6378137,0<br>Semiminor Axis: 6356752,314140356<br>Inverse Flattening: 298,257222101 |
| **Geometric Accuracy (positioning scale)** | |
| N/A | |
| **Thematic Accuracy (in %)** | |
| N/A | |
| **Accuracy Assessment Approach** | |
| Qualitative Expert Assessment | |
| **Data Type** | |
| 1.) Thematic Raster; 8bit unsigned integer in LZW compression<br>2.) Vector | |
| **Delivery Format** | |
| 1.) Thematic Raster (*.TIF)<br>2.) ESRI Shapefile Format (*.SHP) | |
| **Metadata** | |
| ISO TC 211 compliant according to INSPIRE metadata standards in XML format | |
| **Class Coding / Attribution of Thematic Raster** | |

| Field | Description | Type | Value(s) |
|---|---|---|---|
| [OID] | Dynamic Object Identifier | Object ID | 0 to 2,147,483,647 |
| [DU_ID] | Unique Identifier of the Riparian Zones delivery unit | String, Length 10 | DU001A to DU043A |
| [DRZO_CODE] | Class code (membership) of Observable Riparian Zones | Long, Precision 9 | 0 to 100 |
| [DRZO_DESCR] | Membership degree of Observable Riparian Zones in percent [%] | String, Length 254 | 0-100% membership degree of Observable Riparian Zone |
| [COUNT] | Number of pixels per class | Double | 1 to 1.8E308 |
| [AREA_SQKM] | Area in square kilometres [km²] | Double | 0.000625 to 1.8E308 |
| [NODATA] | Unclassifiable area due to clouds, shadows, snow, haze or missing data (no satellite data available) | Short, Precision 4 | 999<br>*otherwise 0* |

| Class Coding / Attribution of Vector Dataset | | | |
|---|---|---|---|
| **Field** | **Description** | **Type** | **Value(s)** |
| [FID] | Dynamic Feature Identifier | Object ID | 0 to 2,147,483,647 |
| [Shape] | Polygon (default by ESRI) | Geometry | Polygon |
| [ID] | Unique Identifier of the feature geometry | Long, Precision 9 | 1 to 2,147,483,647 |
| [DU_ID] | Unique Identifier of the Riparian Zones delivery unit | String, Length 10 | DU001A to DU043A |
| [DRZO_CODE] | Class code of Observable Riparian Zones Extent | Long, Precision 9 | 1 |
| [DRZO_DESCR] | Observable Riparian Zones Extent (≥ 50% membership degree of Observable Riparian Zone) | String, Length 254 | Observable Riparian Zones Extent (≥ 50% membership degree of Observable Riparian Zone) |
| [AREA_SQKM] | Area in square kilometres [km²] | Double | 0.000625 to 1.8E308 |
| [NODATA] | Unclassifiable area due to clouds, shadows, snow, haze or missing data (no satellite data available) | Short, Precision 4 | 999<br>*otherwise 0* |
| [COMMENT] | Comment field for additional information | String, Length 254 | Free text |

## 3.4 Specifications of Actual Riparian Zones

| Product Specifications of Actual Riparian Zone Products |
|---|
| **Product Title / Content** |
| Riparian Zones: Delineation of Actual Riparian Zones |
| **Product Short Name** |
| DRZA |
| **Product Definition** |
| The Actual Riparian Zone is a combination of the Potential and the Observed Riparian Zone. It expresses the probability to find riparian zones on the ground. |
| **Input Data Sources** |
| 1.) Potential Riparian Zone<br>2.) Observable Riparian Zone |
| **Methodology** |
| Spatial Modelling of the *Actual Riparian Zones*, which is based on four pillars: a) Stratification of input data, to determine membership functions, b) the calculation of the Potential Riparian Zone, c) the calculation of the Observable Riparian Zone and d) the final aggregation to derive the Actual Riparian Zone Layer per delivery unit. The Actual Riparian Zone describes the actual extent of the riparian zone inside the Potential Riparian Zone. |
| **Geographic Coverage** |
| EEA-39 (without Azores, Canarias and French DOMs) plus Andorra and Vatican City: ca. 5,825,500 km² |

*Geographic Bounding Box*

| | | |
|---|---|---|
| | *North* **71.185** | |
| *West* **-24.532** | | *East* **44.819** |
| | *South* **34.562** | |

| |
|---|
| **Temporal Reference** |
| 2010 – 2014 |
| **Geometric Resolution / Equivalent Scale** |
| 1.) Thematic Raster: 25m<br>2.) Vector: 1:50,000 |
| **Minimum Mapping Unit** |
| 1.) Thematic Raster: 625 m² (pixel-based)<br>2.) Vector: 625 m² |
| **Minimum Mapping Length** |
| N/A |
| **Minimum Mapping Width** |
| N/A |

| **Coordinate Reference System** | |
|---|---|
| ETRS_1989_LAEA<br>WKID: 3035 Authority: EPSG<br>Projection: Lambert_Azimuthal_Equal_Area<br>false_easting: 4321000,0<br>false_northing: 3210000,0<br>central_meridian: 10,0<br>latitude_of_origin: 52,0<br>Linear Unit: Meter (1,0) | Geographic Coordinate System: GCS_ETRS_1989<br>Angular Unit: Degree (0,0174532925199433)<br>Prime Meridian: Greenwich (0,0)<br>Datum: D_ETRS_1989<br>Spheroid: GRS_1980<br>Semimajor Axis: 6378137,0<br>Semiminor Axis: 6356752,314140356<br>Inverse Flattening: 298,257222101 |
| **Geometric Accuracy (positioning scale)** | |
| N/A | |
| **Thematic Accuracy (in %)** | |
| N/A | |
| **Accuracy Assessment Approach** | |
| Qualitative Expert Assessment | |
| **Data Type** | |
| 1.) Thematic Raster; 8bit unsigned integer in LZW compression<br>2.) Vector | |
| **Delivery Format** | |
| 1.) Thematic Raster (*.TIF)<br>2.) ESRI Shapefile Format (*.SHP) | |
| **Metadata** | |
| ISO TC 211 compliant according to INSPIRE metadata standards in XML format | |
| **Class Coding / Attribution of Thematic Raster** | |

| Field | Description | Type | Value(s) |
|---|---|---|---|
| [OID] | Dynamic Object Identifier | Object ID | 0 to 2,147,483,647 |
| [DU_ID] | Unique Identifier of the Riparian Zones delivery unit | String, Length 10 | DU001A to DU043A |
| [DRZA_CODE] | Class code (membership) of Actual Riparian Zone | Long, Precision 9 | 0 to 100 |
| [DRZA_DESCR] | Membership degree of Actual Riparian Zone in percent [%] | String, Length 254 | 0-100% membership degree of Actual Riparian Zone |
| [COUNT] | Number of pixels per class | Double | 1 to 1.8E308 |
| [AREA_SQKM] | Area in square kilometres [km²] | Double | 0.000625 to 1.8E308 |
| [NODATA] | Unclassifiable area due to clouds, shadows, snow, haze or missing data (no satellite data available) | Short, Precision 4 | 999<br>*otherwise 0* |

| Class Coding / Attribution of Vector Dataset | | | |
|---|---|---|---|
| **Field** | **Description** | **Type** | **Value(s)** |
| [FID] | Dynamic Feature Identifier | Object ID | 0 to 2,147,483,647 |
| [Shape] | Polygon (default by ESRI) | Geometry | Polygon |
| [ID] | Unique Identifier of the feature geometry | Long, Precision 9 | 1 to 2,147,483,647 |
| [DU_ID] | Unique Identifier of the Riparian Zones delivery unit | String, Length 10 | DU001A to DU043A |
| [DRZA_CODE] | Class code of Actual Riparian Zones Extent | Long, Precision 9 | 1 |
| [DRZA_DESCR] | Actual Riparian Zones Extent (combination of Potential and Observable Riparian Zone) | String, Length 254 | Actual Riparian Zones Extent (≥ 50% membership degree of Actual Riparian Zone) |
| [AREA_SQKM] | Area in square kilometres [km²] | Double | 0.000625 to 1.8E308 |
| [NODATA] | Unclassifiable area due to clouds, shadows, snow, haze or missing data (no satellite data available) | Short, Precision 4 | 999<br>*otherwise 0* |
| [COMMENT] | Comment field for additional information | String, Length 254 | Free text |

## 3.5 Specifications of Green Linear Elements

| Product Specifications of Green Linear Elements |
|---|
| **Product Title / Content** |
| Riparian Zones: Green Linear Elements found in a buffer zone of selected rivers |
| **Product Short Name** |
| GLE |
| **Product Definition** |
| The GLE product provides a very high resolution data layer of at least 85% overall thematic accuracy at pan-European scale comprising<br>• vegetated linear structures such as hedgerows, scrubs or tree rows with a width of 10m or smaller, as well as<br>• isolated patches of trees and scrub with a size of 500m² to 5000m², i.e. smaller than the minimum mapping unit of the LC/LU layer.<br>All characteristics are mapped as identifiable from 1.5m to 2.5m DWH CORE_03 satellite imagery<br>The Area of Interest is identical to the LC/LU product.<br>**Thematically**, a breakdown into hedgerows/scrub as well as trees is provided.<br>Trees are defined according to the FAO definition, i.e. reaching a minimum height of 5 m at maturity in situ, which guarantees consistency with other Copernicus data, such as the HRL Forest. Hedgerows/scrub are defined as woody perennial plants, generally of more than 0.5m and less than 5 m height, and often without a definite stem and crown.<br>GLEs exclude grassy elements (e.g. margins along field boundaries), wet elements (drainage ditches, water courses) or artificial elements (any kind of 'grey' infrastructure such as roads or stone walls).<br>Besides the thematic classification, a very distinct **geometric** separation into linear structures as well as areal patches is done. This differentiation takes place by considering a compactness criterion, resulting in a distinct separation of linear structures (low compactness) and patches (high compactness).<br>• Linear structures are characterized by a linear shape (object with low compactness and a circularity below or equal 0.3) and are defined by a width below or equal 10m and a length above or equal 100m. A minimum mapping area criterion is not applied to the linear structures. Hence, features may be <500m² (if very thin <5m) or >5,000m² (if very long >1,000m).<br>• Patches are characterized by a non-linear shape (object with high compactness and a circularity above 0.3) and are defined by a minimum mapping area between 500m² and 5,000m² and a width above or equal 10m. A minimum length criterion is not applied.<br>Due to the absence of data on vegetation height, the thematic separation into trees and hedgerows/scrubs is only possible using the planimetric satellite imagery, which causes a certain ambiguity in the differentiation of those features (i.e. if these are smaller or higher than 5m). |
| **Input Data Sources** |
| 1.) Final Riparian Zones AoI *rpz_europe_rz_aoi_v07.shp*<br>2.) DWH_MG2b_CORE_03 - Optical VHR2 coverage over EU 2011-2013 and Riparian zones<br>• ca. 3,600x SPOT-5 HRG (2.5m) & ca. 400x SPOT-6 (1.5m)<br>• Additional CORE_03 gap-filling VHR2 data that were made available in the course of the project<br>Additional data (where available at the date of production):<br>• Urban Atlas 2006/2012, including Street tree layer<br>• GoogleEarth Pro, Bing Maps, national orthophoto WMS services<br>• Numerous additional in-situ and reference data sources |

**Methodology**

Visual interpretation of Green Linear Elements (hedgerows/scrub and trees) on 1.5m SPOT-6, 2.0m Pléiades and 2.5m SPOT-5 HRG satellite data from the DWH_MG2b_CORE_03 dataset (Optical VHR2 coverage over EU 2011-2013 and Riparian zones). For a detailed distinction between trees and hedgerows/scrub, mainly Google Earth and Bing VHR images were considered as complementary source of information. Additional data from the Urban Atlas have been used to support the mapping of Green Linear Elements.

Mapped features were automatically classified into linear and patch structures using a GIS-based compactness algorithm, followed by a GIS-based generalisation procedure according to the geometric criteria for each feature type. Cloud or shadow covered areas within the DWH_MG2b_CORE_03 dataset where coded separately and are considered as NODATA areas.

**Geographic Coverage**

Riparian zones within EEA-39 (without Azores, Canarias and French DOMs) plus Andorra and Vatican City: ca. 550,000 km²

*Geographic Bounding Box*

| | | |
|---|---|---|
| | *North* **71.185** | |
| *West* **-24.532** | | *East* **44.819** |
| | *South* **34.562** | |

**Temporal Reference**

2010 – 2014

**Geometric Resolution / Equivalent Scale**

1:5,000

**Minimum / Maximum Mapping Unit**

Linear features: n/a

Patches: Minimum: 500m² / Maximum: 5,000m²

**Minimum Mapping Length**

Linear features: 100m (linear structures)

Patches: n/a

**Minimum Mapping Width**

1.) Linear structures: smaller or equal 10m (all features 'identifiable' with the given image resolution of 1.5m/2.5m)
2.) Patches: larger or equal 10m

**Coordinate Reference System**

| | |
|---|---|
| ETRS_1989_LAEA | Geographic Coordinate System: GCS_ETRS_1989 |
| WKID: 3035 Authority: EPSG | Angular Unit: Degree (0,0174532925199433) |
| Projection: Lambert_Azimuthal_Equal_Area | Prime Meridian: Greenwich (0,0) |
| false_easting: 4321000,0 | Datum: D_ETRS_1989 |
| false_northing: 3210000,0 | Spheroid: GRS_1980 |
| central_meridian: 10,0 | Semimajor Axis: 6378137,0 |
| latitude_of_origin: 52,0 | Semiminor Axis: 6356752,314140356 |
| Linear Unit: Meter (1,0) | Inverse Flattening: 298,257222101 |

**Geometric Accuracy (positioning scale)**

< 5m RMSE (according to ortho-rectified DWH CORE_03 satellite imagery delivered by ESA).

| **Thematic Accuracy (in %)** |
|---|
| Target Overall Accuracy: ≥ 85% (average on pan-European scale).<br>Accuracy calculation considers the thematic separation into hedgerows/scrub and trees (2 classes); the separation of linear and patch structures is an internal processing step for the subsequent application for MMU/MMW/MML, but not subject to validation. |
| **Accuracy Assessment Approach** |
| Stratified Random Sampling of 1km² grid cells (from EEA Reference Grid) considering the relative occurrence of the two GLE classes within the RZ AoI.<br>For internal validation, the SP has applied the following approach:.<br>1. Calculate proportion of hedgerows/scrub and trees per 1km² grid cells (from EEA Reference Grid)<br>2. Selection of **grid cells** representative for different strata of GLE occurences<br>3. Visual re-interpretation of GLE in each selected grid cell<br>4. Intersection of layers (on pixel level) and calculation of confusion matrix (number of non-GLE pixels limited to the sum of GLE pixels, avoiding an under-/overrepresentation of features in the statistical evaluation)<br>5. Calculation of accuracy figures (user/producer accuracies, overall accuracy, Kappa statistic)<br>Taking into account the possibility to identify green linear elements from VHR CORE_03 data, it is strongly suggested that only elements with a minimum width of at least 2 pixels (5m) are accounted for validation. Going below this limit undermines the criterion of being "identifiable with the given image resolution (2-2.5m)". Although elements with smaller widths will be mapped to the highest extent possible, their mapping – and also their validation - depends on the quality of higher resolution data not consistently available in Europe. |
| **Data Type** |
| Vector |
| **Delivery Format** |
| ESRI Shapefile Format (*.SHP) |
| **Metadata** |
| ISO TC 211 compliant according to INSPIRE metadata standards in XML format |

| Class Coding / Attribution | | | |
|---|---|---|---|
| **Field** | **Description** | **Type** | **Value(s)** |
| [FID] | Dynamic Feature Identifier | Object ID | 0 to 2,147,483,647 |
| [Shape] | Polygon (default by ESRI) | Geometry | Polygon |
| [ID] | Unique Identifier of the feature geometry | Long, Precision 6 | 1 to 2,147,483,647 |
| [DU_ID] | Unique Identifier of the Riparian Zones delivery unit | String, Length 10 | DU001A to DU043A |
| [LFT_CODE] | Linear feature type code of the collected geometry | Long, Precision 6 | 0, 1, 2 |
| [LFT_DESCR] | Linear feature type of the collected geometry | String, Length 25 | Trees (1)<br>Hedgerows/scrub (2)<br>*otherwise blank (0)* |
| [PTCH_CODE] | Patch code of the collected geometry | Long, Precision 6 | 0, 1, 2 |
| [PTCH_DESCR] | Description of the collected isolated patch | String, Length 25 | Trees (1)<br>Hedgerows/scrub (2)<br>*otherwise blank (0)* |
| [BORD_CODE] | Delivery unit border code of the collected GLE | Long, Precision 6 | 0, 1, 2 |
| [BORD_DESCR] | Description of collected GLE delivery unit border code | String, Length 25 | GLE within AoI (0)<br>GLE at border of AoI that fits the specification (1)<br>GLE at border of the AoI that does not fit the specifications (due to clip by AoI) (2) |
| [LENGTH] | Length of feature geometry in meter [m] | Double | 100 to 1.8E308 |
| [AREA_SQM] | Area in square meter [m²] | Double | 100 to 1.8E308 |
| [NODATA] | Unclassifiable area due to clouds, shadows, snow, haze or missing data (no satellite data available) | Long, Precision 6 | 0, 1 |
| [COMMENT] | Comment field for additional information | String, Length 254 | Free text |