

## Georeferencing and characterization of the Douro River Basin obstacles – Portugal

LEF- UTAD

Vila Real



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## Summary

Dams provide water supply, flood protection, and hydropower generation benefits, but also harm native species by altering the natural flow regime, and degrading the aquatic and riparian habitats. Dams provide water supply, flood protection, and hydropower generation benefits, but also harm native species by altering the natural flow regime, and degrading the aquatic and riparian habitats. In the present study, which comprised the Douro River basin located in the North of Portugal, an inventory of barriers (dams and weirs) was accomplished through an observation of satellite images and military cartography (1:25000). Besides identification and location of any obstacles, the inventory comprised the compilation of data on surrounding land use, reservoir water use, characteristics of the riparian gallery, and permeability conditions for fish, among others. Further, hereafter with this inventory, it will be possible to develop a probabilistic stream connectivity model to recommend priorities for dam removal, where this action could significantly improve the movement of potadromous fish species along the local streams. It is also planned to implement a multi-criteria decision support system for dam removal or mitigation of the critical structures, as well to define exclusion areas for additional obstacles.

## Methodology

The focus of this work is to prioritize dam removal and for that, it is necessary to develop a geospatial database and inventory all existing dams in the Douro river basin and subsequently characterize them. The method we used to prioritize dam removal follows the steps of the McKay et al. model [1], which generally comprise: 1) Set the scope, 2) develop a geospatial database, 3) predict connectivity for the watershed, 4) compute costs and benefits of alternative scenarios, 5) summarize information for decision making and take action, and 6) do not forget post-project actions. The full inventory of these steps is portrayed in Figure 1 in the form of a general workflow. This figure highlights **steps 1 and 2** covered in this study. As mentioned above, the current objectives are focused on exploring a connectivity model to set up a dam removal

priority. Although the general steps are inspired by this work of McKay and his co-workers, the specific steps were adjusted to the study area (steps 1 and 2).

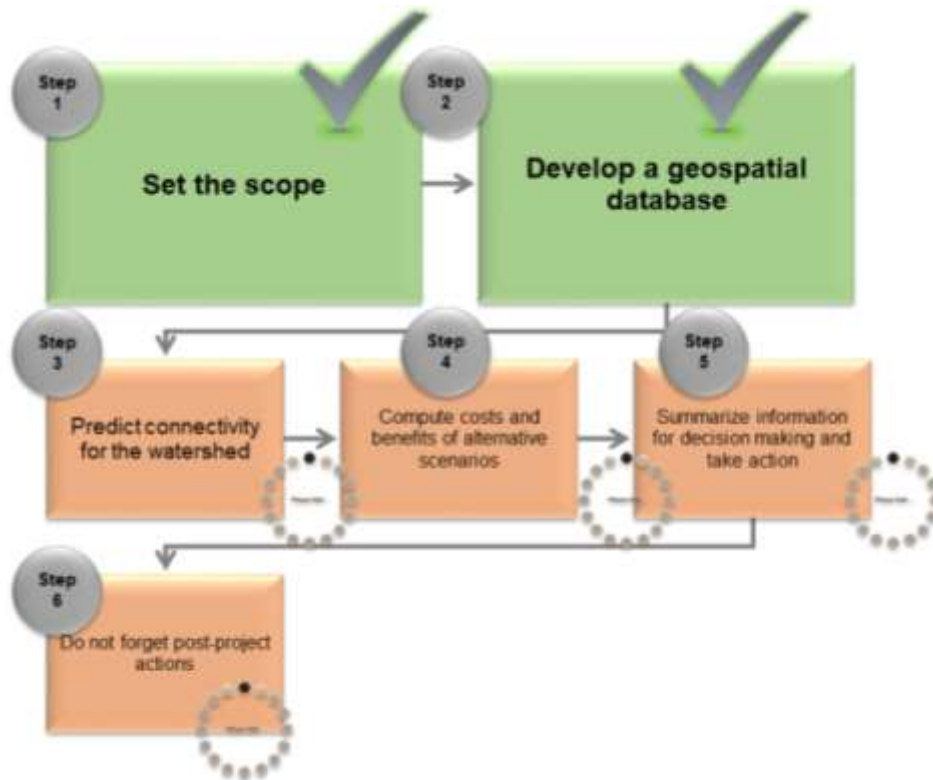


Figure 1: General workflow for prioritizing dam removal. Steps 1 and 2 are addressed in this study, while steps 3–6 correspond to ongoing research.

### a) Step 1. Identify the Scope of the Analysis

Step 1 is focused on the characterization of the Douro Basin's stream network (Portuguese side). The selection of this Portuguese Douro catchment allows extending a yesilar work already accomplished on the Spanish side (<https://www.chduero.es/documents/20126/734183/ic.pdf>).

The characterization step spanned the compilation of digital data on catchment limits (Douro Basin and main tributaries) as well as on the corresponding drainage network; the location of dams and other obstacles as well as of associated reservoirs and their extension; the preliminary assessment of riparian galleries and urban areas in the neighbourhood of reservoirs; and finally the land use along the main tributaries. The main water course (the River Douro) was excluded from the analysis. This decision was considered inevitable, but did impose some restrictions to the connectivity analysis. The

issues and implications involved in this decision were the large Crestuma-Lever dam, installed in the Douro River close to the estuary, virtually impedes the migration of diadromous species such as Atlantic salmon or European brook and river lampreys. The fish passages are ineffective, and there is a sharp salinity contrast between the fresh river water upstream of the dam, and the brackish water downstream. However, it is not considered possible to remove the dam because of its importance for hydropower generation.

It is therefore inevitable to be required to keep the large infrastructures of the Douro on site. Facing the aforementioned options, the current assessment on connectivity will not cover the benefits of dam removal for the Diadromous species. The rationale differs for Potamodromous species such as brown trout, because the other Douro River dams are equipped with fish passages, which regardless of poor maintenance, allow the movement of fish. In this case, the connectivity along the main water course is less affected.

## **b) Step 2. Develop a Geospatial Database**

The Step 2 was developed during 2018 to store all information related to the project. The operational steps are illustrated in Figure 1. Firstly, the hydrographic and drainage information was extracted from the European EU-Hydro basis, which was developed under the Copernicus program <https://land.copernicus.eu/pan-european/satellite-derived-products/eu-hydro/eu-hydro-public-beta/view>. This information is available in vector format (geodatabase), and contains high resolution drainage network elements such as basins, catchments, drainage lines and nodes; it also includes dams, coastlines and land polygons. Secondly, satellite images from Google™ and Bing™ were visually interpreted to obtain data on the location of obstacles, type of barrier (dam or weir) and its physical characterization (e.g., material used in the construction, presence of fish passage or water mill), as well as any surrounding settings (e.g., type of riparian gallery 100 m upstream and 100 m downstream from the site). Thirdly, complementary information was interpreted from military maps (e.g., quality of road access; <https://www.igeoe.pt>), or compiled from institutional sources. In the latter case the

complementary information included land use in the 1 km buffer obtained from COS2015 cartography (<http://www.dgterritorio.pt/>), or data about fish passage characteristics in large dams obtained from the National Institute for the Conservation of Nature and Forests (<https://www.icnf.pt/>). The full check-list of parameters included in the geospatial database is provided as **Supplementary Material**.

## Preliminary Results

After a thorough and detailed survey of the Portuguese hydrographic basin of the Douro River, through satellite images and military cartography, among other complementary information, a total of 1201 barriers were inventoried (Figure 2).

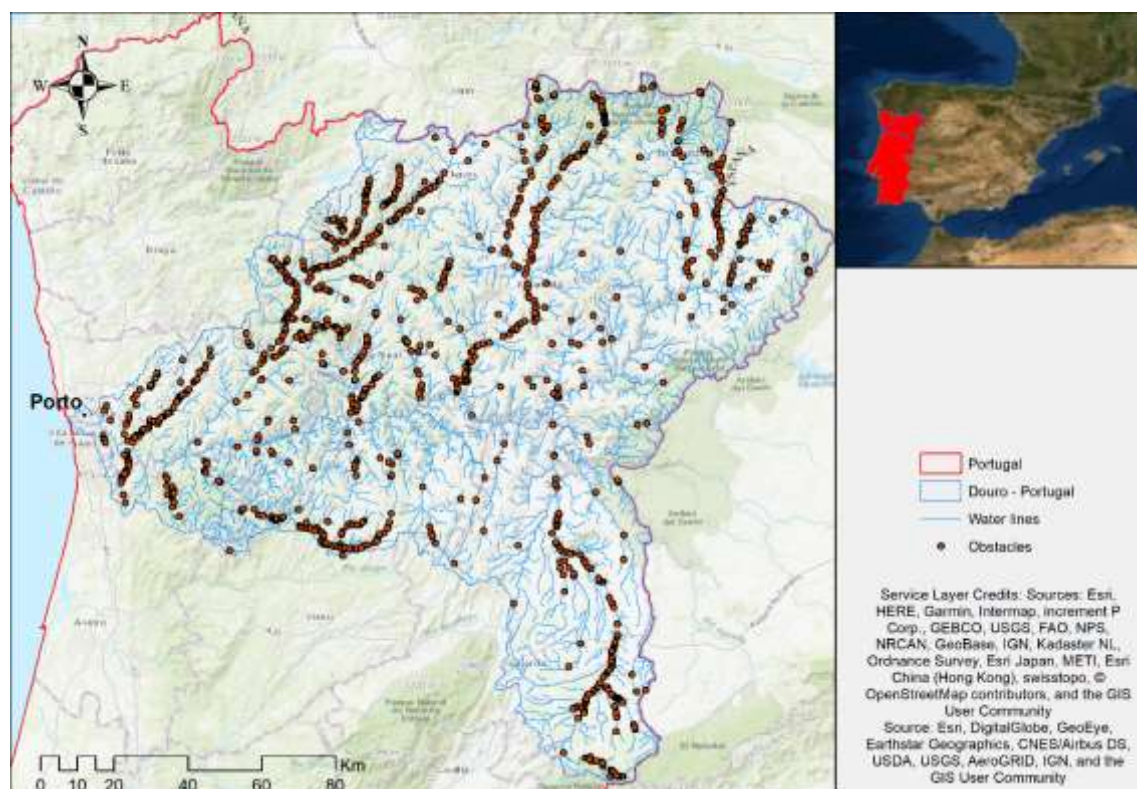


Figure 2: Inventoried obstacles in the Douro river basin.

In order to facilitate the characterization of the Douro river basin, its description will then be made by sub-basins. The Douro is composed of numerous tributaries, of which 30 present obstacles and will be characterized individually.



The Aguiar tributary (**Figure 3**) presents three obstacles. Of these, two are large infrastructures. **Table 1** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**. **Table 2** and **3** shows the specific characteristics of the large dams.

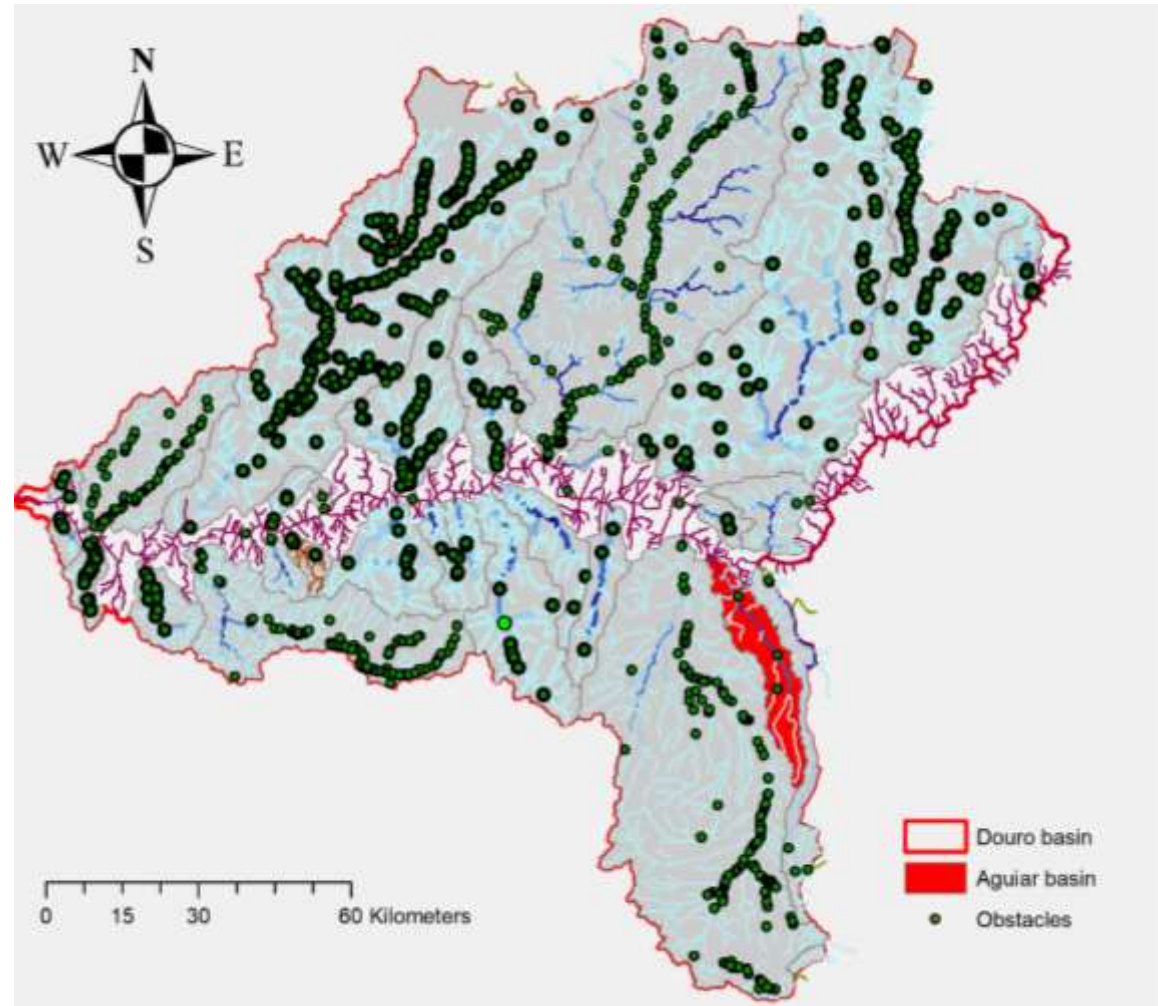



Figure 3: Highlight the Aguiar river basin.

Table 1: Obstacles characteristics in Aguiar sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
550	Ribeir a de Aguiar	2	1	Sim	2	Sim			2	1	3	3			97186.73	145105.9		
549 - Santa Maria de Aguiar dam*	Ribeir a de Aguiar	1	1		2	Sim			2	1	3	3	1	Santa Maria de Aguiar dam.	104893	133500.3		
551 – Vermiosa dam*	Ribeir a de Aguiar	2	1		2	Sim			2	1	3	3	1	Ribeira da Devesa.	104843.7	126929		

## Santa Maria de Aguiar Dam


Table 2: Santa Maria de Aguiar Dam characteristics.

Infraestruture	Height (m)	Watershed area (km2)	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m3)	Useful capacity (m3)
	20,0	128.5	Homogeneous land	Water supply and irrigation	624 m	450	6	5400 x 1000	5100 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Vermiosa Dam

Table 3: Vermiosa dam characteristics.

Infraestructure	Height (m)	Watershed area (km2)	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m3)	Useful capacity (m3)
	18.0	11.9	Zoned land	Irrigation	688	288	6	2250 x 1000	2200 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.

The Arda tributary (**Figure 4**) presents 21 obstacles. Of these, all are weirs except the Balaido Mini Hydro. **Table 4** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**. In **table 4**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 5**.

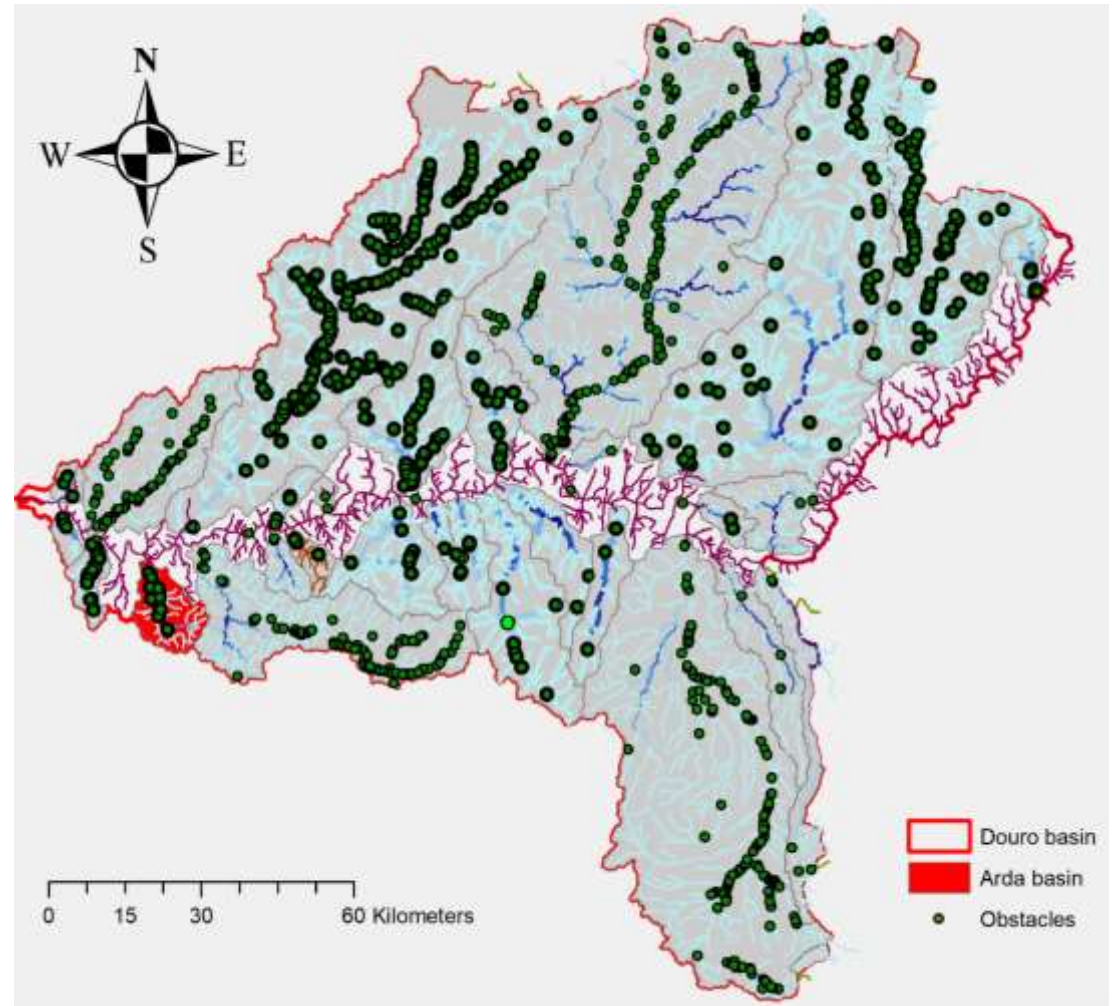


Figure 4: Highlight the Arda river basin.

Table 4: Obstacles characteristics in Arda sub-basin

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
570	Arda	1	1		1	yes			2	1	3	3			-17218.7	145792.5		
569	Arda	1	1		1	yes	2	1	2	1	3	3			-19421.6	149635.1	2	2
571	Arda	1	1		1	yes			2	1	3	3			-17576.8	143753.5		
1513	Arda	1	1		1	Yes			2	1	3	3			-18941.8	148727		
1514	Arda	1	1		1	Yes			2	1	3	3			-19134.5	146845.4		
1520	Arda	1	1		1	Yes			2	4	3	3			-17338.3	141309.3		
1526	Arda	2	2	Yes	1	Yes			2	1	3	3		Affluent river	-18683.9	144532.8		
1518	Arda	1	1		1	Yes			2	1	3	3			-17286.3	142452.4		
1519	Arda	1	1		1	Yes			2	1	3	3			-17326.2	141710.6		
1521	Arda	1	1	Yes	1	Yes			2	4	3	3			-17464.3	141113.1		
1522	Arda	1	1	Yes	1	Yes			2	4	3	3			-17497	141070.5		
1523	Arda	2	2	Yes	1	Yes			2	1	3	3		Affluent river	-17985.5	144351.4		
1524	Arda	2	2		1	Yes			2	1	3	3		Affluent river	-18155.9	144503.9		
1525	Arda	2	2	Yes	1	Yes			2	1	3	3		Affluent river	-18450.3	144493.6		
1527	Arda	2	2		1	Yes			2	1	3	3		Affluent river	-18739.1	144543.6		
1528	Arda	2	2	Yes	1	Yes			2	1	3	3		Affluent river	-18924.8	144471.9		
572	Arda	1	1		2		1	2	2	1	3	3	1	Possibly it will be a mini hydro Private place	-17559.8	146119.8	2	2
1515		1	1	Yes	1	Yes			2	1	3	3			-17556	146634.6		
1516	Arda	1	1		1	Yes			2	1	3	3			-17258.9	144841.8		
1517	Arda	1	1		1	Yes			2	1	3	3			-17099.6	142467.4		
1611	Arda	1	2		1	yes	1	2	2	4	3	3					2	

Table 5: Pictures of the obstacles seen in field in Arda sub-basin.

Obstacles seen in field			
569		572	
			



The Arroio tributary (Figure 5) presents two obstacles. Both are large infrastructures. **Table 6** shows the characteristics collected at the time of the inventory, the caption is in **Annex I. Table 7** shows the specific characteristics of the large dams.

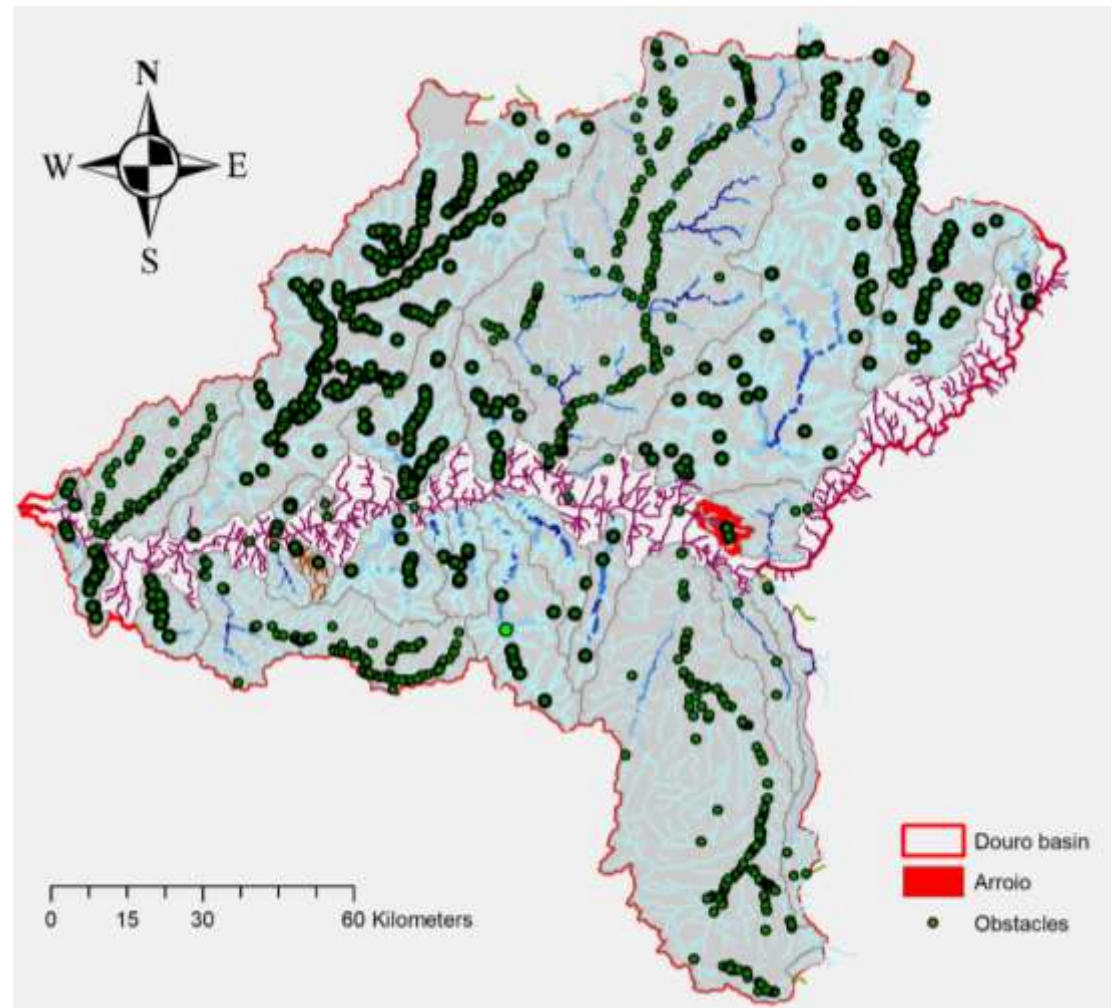


Figure 5: Highlight the Arroio river sub-basin.


Table 6: Obstacles characteristics in Arroio sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
Olgas dam *	Ribeira do Arroio	1	1		2	Yes			2	1	3	3		Olgas dam	94969.92	160177.1	2	2
Arroio dam	Ribeira do Arroio	1	1		2	Yes			2	1	3	3		Arroio dam	95442.38	158352.7		2

Source: [http://cnpqg.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqg.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Olgas Dam

Table 7: Olgas Dam characteristics.

Infraestrutture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	34.5	128.5	Concrete	Water supply	-	-	-	5400 x 1000	5100 x 1000

Source: <http://www.terrasdeportugal.pt/barragem-das-olgas>

## Arroio Dam

No further relevant data was found on this dam.

\* The barriers identified are shown in Table 96, showing more details of data about them.



The Águeda sub-basin (**Figure 6**) presents 5 obstacles. Of these, all are weirs. **Table 8** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**. In **table 8**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 9**.

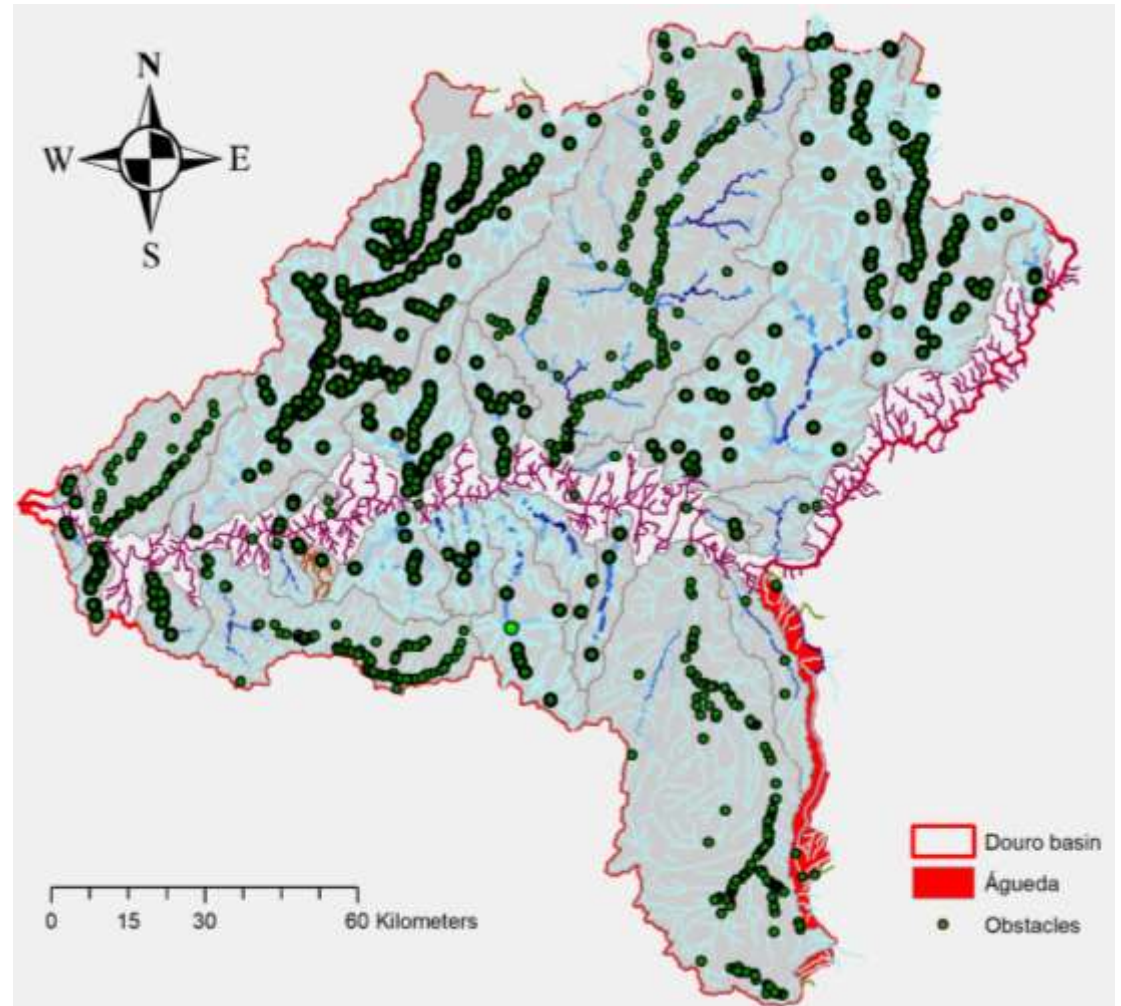


Figure 6: Highlight the Águeda river sub-basin.

Table 8: Obstacles characteristics in Águeda sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
548	Agueda	2	1		2	Yes			2	1	3	3		Ribeira de Touros. Ribeira de Nave.	108319.4	90989.83		2
1230	Agueda	2	2	Yes	1	Yes			2	1	3	3		Ribeira de Nave	110764.3	91367.11		
1231	Agueda	2	2	Yes	1	Yes			2	1	3	3		Affluent river - Ribeira de Touros	107060.4	95622.17		
1232	Agueda	1	2	Yes	1	Yes	2	2	2	1	3	3		Semi-disaggregated weir	103314.9	147968.4	2	2
1233	Agueda	1	2	Yes	1	Yes			2	1	3	3		Rio Fronteira	103088.8	148330.9		

Table 9: Picture of the obstacle seen in field in Águeda sub-basin.



The Bestança tributary (**Figure 7**) presents 4 obstacles. Of these, all are weirs. **Table 10** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**. In **table 10**, the obstacles highlighted in green, were seen in the field.

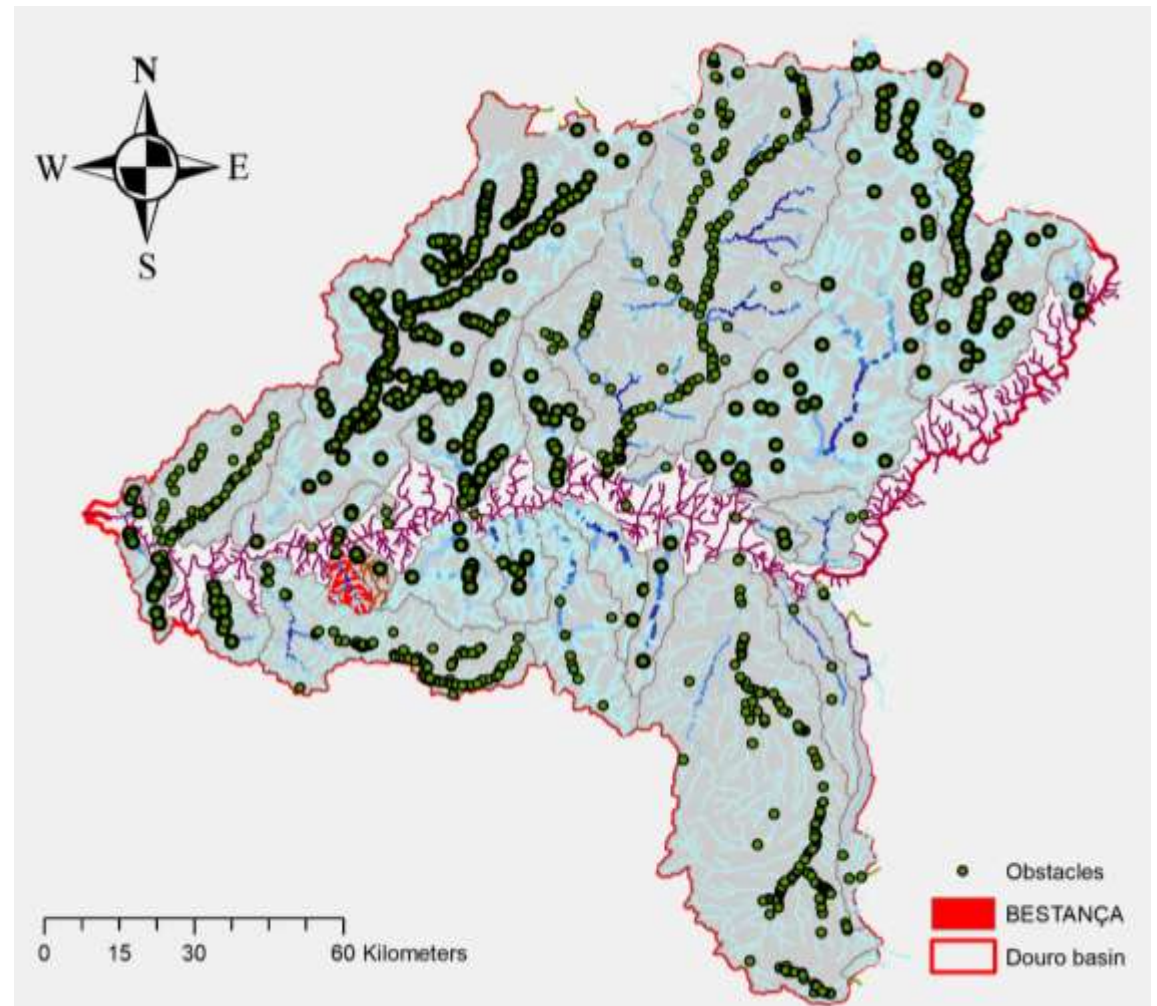


Figure 7: Highlight the Bestança river sub-basin.

Table 10: Obstacles characteristics in Bestança sub-basin

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	LONG	LAT	Fish pass	Barrier shape
1623	Bestança	2	2		1	Yes	2	2	2	4	3	3			-8.07151	41.07413	2	
1624	Bestança	2	2		1	Yes	2	2	2	4	3	3			-8.0715	41.07515	2	
1625	Bestança	2	2		1	Yes			2		3	3						
1626	Bestança	2	2		1	Yes			2		3	3						

The Cabrum tributary (**Figure 8**) presents three obstacles. Of these, two are large infrastructures. **Table 11** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**. **Table 12** and **13** shows the specific characteristics of the large dams. In **Table 11**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **Table 14**.

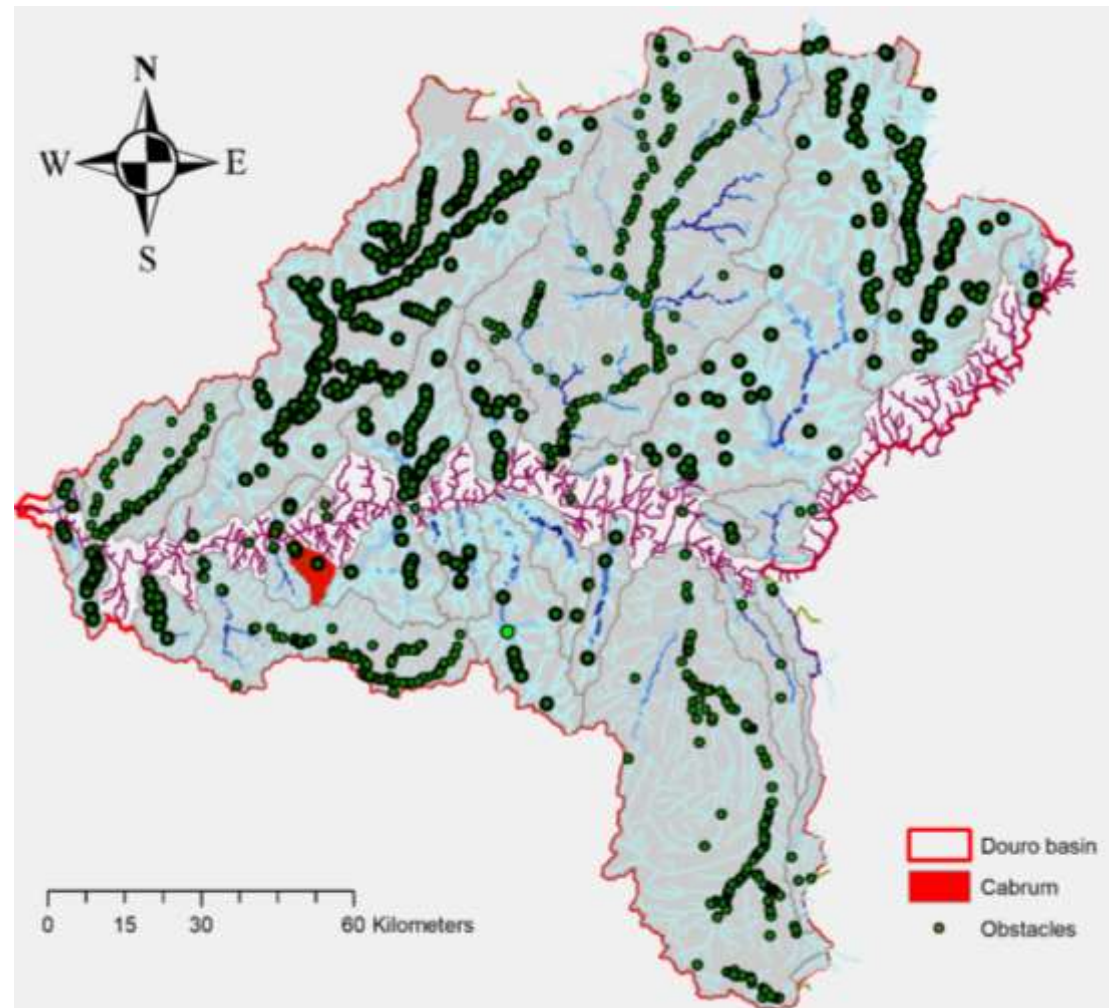


Figure 8: Highlight the Cabrum river sub-basin.




Table 11: Obstacles characteristics in Cabrum sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
566 - Freigil dam *	Cabrum	1	1		2	Yes			2	1	3	3	5	Freigil dam.	9624.537	155655.7	2	1
567 - Cabrum dam	Cabrum	1	1		2	Yes			2	1	3	3	5	Cabrum dam.	13955.89	153167.2		2
568 - Aregos weir	Cabrum	1	1		2	Yes			2	1	3	3	5		9204.561	156269.1		2

## Freigil dam


Table 12: Freigil Dam characteristics

Infraestructure	Height (m)	Watershed area (km²)	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m³)	Useful capacity (m³)
	17	54	Concrete	Energy	319.7	73	1.6	140 x 1000	138 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Cabrum dam or Ovadas Mini-hydro

Table 13: Cabrum Dam characteristics

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	9	-	Concrete	Energy	-	43	-	-	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

Table 14: Picture of the obstacle seen in field in Cabrum sub-basin.

Obstacles seen in field	
567- Cabrum dam	
	

\* The barriers identified are shown in Table 96, showing more details of data about them.

The Côa tributary (**Figure 9**) presents 150 obstacles. Of these, 5 are large infrastructures and other 5 is Mini hydro's infrastructures. **Table 15** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**. **Table 16 to 20** shows the specific characteristics of the large dams. In **table 4**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 21**.

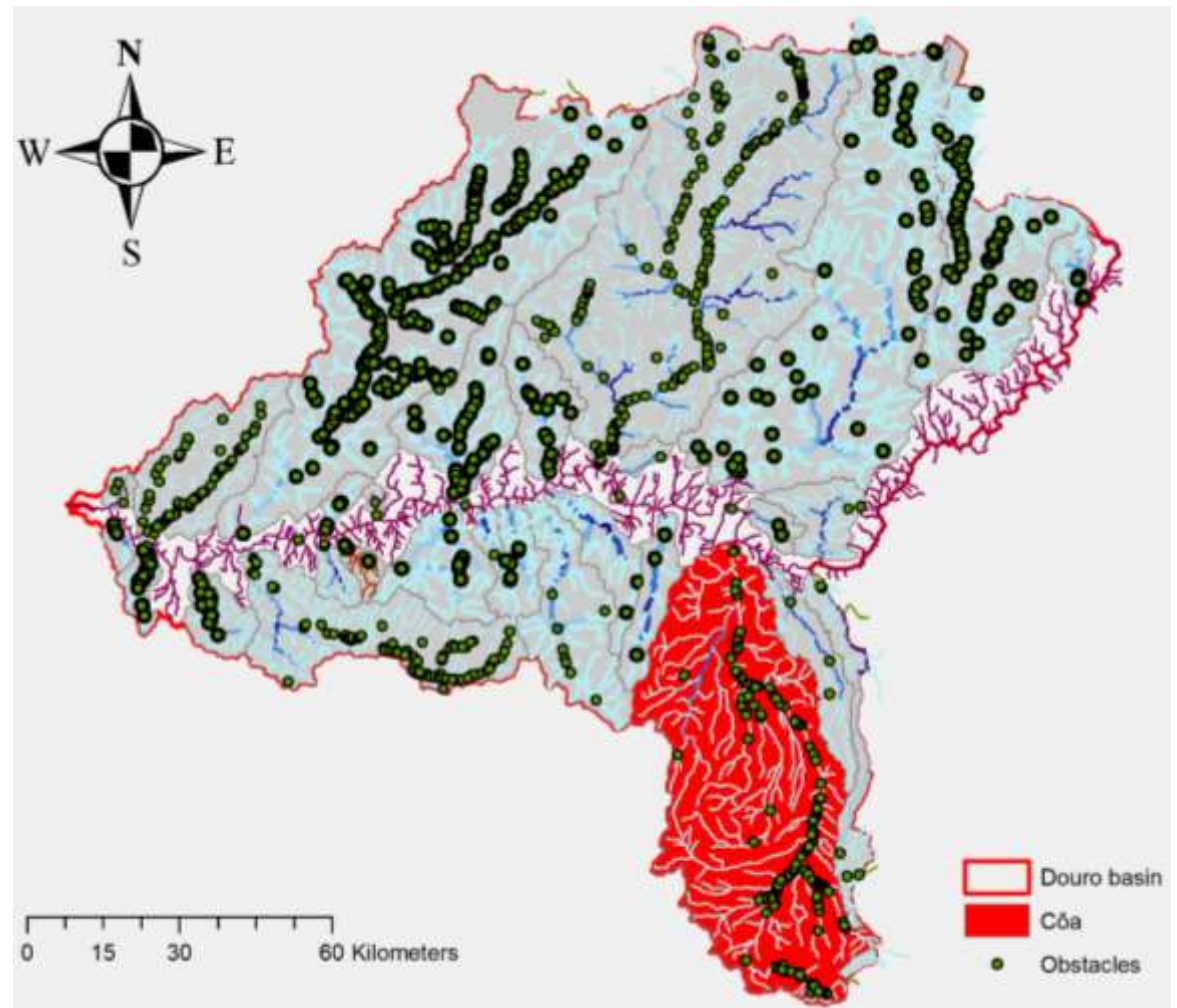


Figure 9: Highlight the Côa river sub-basin.



Table 15: Obstacles characteristics in Cõa sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
371	Coa	2	2	Yes	2	Yes			2	1	3	3			91296.98	122568.9		
361	Coa	1	2		2	Yes			2	1	3	3			101989.2	102439.3		
364	Coa	1	2	Yes	1	Yes			2	1	3	3			95952.41	124472.6		
363	Coa	1	2		1	Yes			2	1	3	3			100924.4	116561.2		
365	Coa	1	2	Yes	2	Yes			2	1	3	3			86094.51	155134.3		
367	Coa	2	2	Yes	2	Yes			1	1	3	3			88380.36	122795.6		
372	Coa	2	2	Yes	2	Yes			2	1	3	3			91272.44	122413.3		
370	Coa	2	2	Yes	1	Yes			2	1	3	3			89939.39	124680.7		
373 - Albufeira das Cabras (reservoir)	Coa	2	1		2	Yes			2	1	3	3		Albufeira da Ribeira das Cabras.	93167.84	104037		2
376 - Senhora do Monforte dam *	Coa	1	1	Yes	2	Yes			2	1	3	3	5	Senhora do Monforte Mini hydro	94038.83	126572.3		2
377	Coa	1	2	Yes	1	Yes			2	1	3	3	5		101680.5	115050.2		2
358	Coa	1	2		2	Yes			2	1	3	3			96815.9	72173.34		
378	Coa	2	2	Yes	2	Yes			2	1	3	3		Affluent river.	99331.74	120811.1		
379	Coa	2	2		1	Yes			2	1	3	3		Affluent river. Ribeira das Cabras.	89901.94	97786.49		
380	Coa	2	2	Yes	1	Yes			1	1	3	3		Affluent river.	91362.68	122988		
368 – Vascoveiro dam	Coa	2	1		2	Yes			2	1	3	3		Vascoveiro dam. Ribeira da Pega. Water supply	88816.9	118119.7		2
462	Coa	1	2		2	Yes			2	1	3	3			101362	69783.94		
468	Coa	1	2	Yes	1	Yes			2	2	3	3			100075.3	95855.48		
469	Coa	1	2	Yes	2	Yes			2	1	3	3			101543.7	97665.73		

465 – Alfaiates dam	Coa	2	1		2	Yes			2	1	3	3	1	Alfaiates dam	102690.9	80199.68		2
466 *	Coa	2	1	Yes	2	Yes			2	2	3	3			102881.3	84140.45		2
470	Coa	2	1		2	Yes			2	1	3	3		Affluent river-	87526.64	124603.1		2
471 - Bouça Cova dam*	Coa	2	1		2	Yes			2	1	3	3	1	Bouça Cova dam. Water supply and irrigation.	74920.2	114947.4		2
472	Coa	2	1	Yes	2	Yes			2	1	3	3		Affluent river-	76185.04	130659.4		2
467	Coa	2	2		1	Yes			2	1	3	3			107490.3	82117.56		
464	Coa	1	2	Yes	2	Yes	Yes		2	1	3	3			94915.54	89825.4		
356	Coa	1	2		2	Yes			2	1	3	3			99225.12	70884.92		
357	Coa	1	2		1	Yes			2	1	3	3			97149.8	72220.09		
678	Coa	2	2	Yes	2	Yes			2	1	3	3		Ribeira do Abedoeiros	101261.7	68067.18		
675	Coa	1	2	Yes	1	Yes			2	1	3	3			102152.1	69132.15		
676	Coa	1	2	Yes	1	Yes			2	1	3	3			102169.5	68871.15		
677	Coa	1	2	Yes	1	Yes			2	1	3	3			102380.5	68881.55		
679	Coa	1	2	Yes	1	Yes			2	1	3	3			98773.32	120833.3		
680	Coa	1	2	Yes	1	Yes			2	1	3	3			98256.03	121008.3		
681	Coa	1	2	Yes	1	Yes			2	1	3	3			98047.79	121719.9		
683	Coa	1	2		1	Yes			2	1	3	3			95015.88	124903.8		
715	Coa	2	2	Yes	1	Yes			2	1	3	3		Ribeira Vila Maior	100001.6	92195.16		
716	Coa	2	2	Yes	1	Yes			2	1	3	3		Ribeira da Aldeia	100343.5	92207.34		
714	Coa	2	2	Yes	1	Yes			2	1	3	3		Ribeira Vilar Maior	99992.35	92117.89		
718	Coa	2	2	Yes	1	Yes			2	1	3	3		Ribeira da Aldeia	100694.9	91523.43		
719	Coa	2	2	Yes	2	Yes			2	4	3	3		Affluent river - Ribeira da Aldeia	102031.5	90031.53		
720	Coa	2	2	Yes	1	Yes			2	4	3	3		Ribeira da Aldeia	102102.3	89862.26		
756	Coa	1	2	Yes	1	Yes			2	1	3	3			89513.16	128799.1		

757	Coa	1	2	Yes	1	Yes			2	1	3	3			89151.54	128965.4		
764	Coa	1	2	Yes	1	Yes			2	1	3	3			104483.9	67963.21		
765	Coa	1	2	Yes	1	Yes			2	1	3	3			104381.3	67909.12		
769	Coa	1	2	Yes	1	Yes			2	1	3	3			103451.3	68109.26		
770	Coa	1	2	Yes	1	Yes			2	1	3	3			103168.1	68173.84		
798	Coa	1	2	Yes	1	Yes			2	1	3	3			101781.9	99717.96		
799	Coa	1	2	Yes	1	Yes			2	1	3	3			101500.7	100457.8		
800	Coa	1	2	Yes	2	Yes			2	1	3	3			101523.4	101680.1		
804	Coa	1	2	Yes	1	Yes			2	1	3	3			101579.2	102027.7		
807	Coa	1	2	Yes	1	Yes			2	1	3	3			102333.7	103493.5		
809	Coa	1	2	Yes	1	Yes			2	1	3	3			102372.3	103715.5		
811	Coa	1	2	Yes	1	Yes			2	1	3	3			102501.4	104188		
812	Coa	1	2	Yes	1	Yes			2	1	3	3			102520.3	104414.6		
814	Coa	1	2	Yes	1	Yes			2	1	3	3			102879.6	106133.9		
816	Coa	1	2	Yes	1	Yes			2	1	3	3			103121.2	106364.4		
359	Coa	1	2		1	Yes	Yes		2	1	3	3			95884.57	72161.29		
688	Coa	1	2	Yes	1	Yes			2	1	3	3			88268.76	129088.7		
360	Coa	1	2		2	Yes			2	1	3	3			92435.74	83841.1		1
463 – Sabugal dam *	Coa	1	1		2	Yes			2	1	3	3	2	Sabugal-dam. Water supply and irrigation	88411.61	74431.67		2
362 - Riba-Coa Mini-hydro	Coa	1	1	Yes	2	Yes			2	1	3	3	5	Riba-Coa	102193.8	113880.8		2
366 – Pinhel Mini-hydro	Coa	2	1	Yes	2	Yes			1	1	3	3	5	Pinhel.	87629.07	126182.1		2
369 - Mini-hydro	Coa	2	1	Yes	2	Yes			1	1	3	3	5	Mini-hydro.	88894.4	126535.6		2
375 - Mini hydroVale de Madeira	Coa	1	1		2	Yes			3	1	3	3	5	Mini-hydro Vale de Madeira	94334.37	126063.8	S	2
666	Coa	1	2	Yes	1	Yes			2	1	3	3			94324.6	73063.54		
667	Coa	1	2	Yes	1	Yes			2	1	3	3			95139.95	72811.04		
668	Coa	1	2	Yes	1	Yes			2	1	3	3			95770.69	73360.36		
669	Coa	1	2	Yes	1	Yes			2	1	3	3			95582.01	72524.56		
670	Coa	1	2	Yes	2	Yes			2	1	3	3			97409.75	72246.08		
671	Coa	1	2	Yes	1	Yes			2	1	3	3			98937.66	71945.89		
672	Coa	1	2	Yes	1	Yes			2	1	3	3			99022.47	71603.28		
673	Coa	1	2	Yes	1	Yes			2	1	3	3			101705.3	69671.25		


674	Coa	1	2	Yes	1	Yes			2	1	3	3			101865	69386.64		
684	Coa	1	2	Yes	1	Yes			2	1	3	3			93077.94	128126.2		
686	Coa	1	2	Yes	1	Yes			2	1	3	3			90966.17	128476.5		
687	Coa	1	2	Yes	1	Yes			2	1	3	3			90390.88	128296.1		
689	Coa	1	2	Yes	1	Yes			2	1	3	3			87657.43	129655.1		
690	Coa	1	2	Yes	1	Yes			2	1	3	3			87432.81	130451.8		
691	Coa	1	2	Yes	1	Yes			2	1	3	3			86536.45	131041.3		
692	Coa	1	2	Yes	1	Yes			2	1	3	3			86443.83	131494.8		
693	Coa	1	2	Yes	1	Yes			2	1	3	3			85339.78	133943.5		
698	Coa	1	2	Yes	1	Yes			2	1	3	3			86635.23	135779.3		
699	Coa	1	2	Yes	1	Yes			2	1	3	3			86581.9	136679		
700	Coa	1	2	Yes	1	Yes			2	1	3	3			86759.61	136312.7		
701	Coa	1	2	Yes	1	Yes			2	1	3	3			86709.12	137216.5		
702	Coa	1	2	Yes	1	Yes			2	1	3	3			86777.45	137851.1		
703	Coa	1	2	Yes	1	Yes			2	1	3	3			86777.1	138017.7		
704	Coa	1	2	Yes	1	Yes			2	1	3	3			87156.36	139061.4		
738	Coa	1	1	Yes	2	Yes			2	1	3	3			85981.09	154972.3		1
705	Coa	1	2	Yes	1	Yes			2	1	3	3			87235.69	139329		
706	Coa	2	2	Yes	1	Yes			2	1	3	3		Ribeira dos Alfaiates	102737.7	85151.96		
709	Coa	1	2	Yes	1	Yes			2	1	3	3		Ribeira dos Alfaiates	102622.5	86754.44		
710	Coa	2	2	Yes	1	Yes			2	1	3	3		Ribeira dos Alfaiates	102543.1	86911.64		
711	Coa	2	2	Yes	1	Yes			2	1	3	3		Ribeira dos Alfaiates	102384.8	87061.62		
721	Coa	2	2	Yes	2	Yes			2	4	3	3		Affluent river - Ribeira da Aldeia	101509.3	90134.18		
722	Coa	2	2	Yes	1	Yes			2	4	3	3		Ribeira da Aldeia	101485.2	90208.63		
723	Coa	2	2	Yes	2	Yes			2	1	3	3		Ribeira da Aldeia	102637.9	89296.35		
724	Coa	2	2	Yes	1	Yes			2	1	3	3		Ribeira da Aldeia	102908.8	89257.75		
725	Coa	2	2	Yes	1	Yes			2	1	3	3		Affluent river-Ribeira da Aldeia	103001.5	89201.97		

726	Coa	2	2	Yes	1	Yes			2	1	3	3		Ribeira da Aldeia	103320.1	89206.03		
727	Coa	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Ribeira da Aldeia	103393.7	89190.88		
728	Coa	2	2	Yes	1	Yes			2	1	3	3		Ribeira da Aldeia	103552.5	89174.69		
729	Coa	2	2	Yes	1	Yes			2	1	3	3		Affluent river Ribeira da Aldeia	103574.6	89173.63		
730	Coa	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Ribeira da Aldeia	103599.8	89141.9		
731	Coa	2	2	Yes	1	Yes			2	1	3	3		Ribeira da Aldeia	103848.7	88808.03		
732	Coa	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Ribeira da Aldeia	104158.6	88393.88		
733	Coa	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Ribeira da Aldeia	104566.5	88145.24		
734	Coa	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Ribeira da Aldeia	104658.6	88036.72		
735	Coa	2	2	Yes	1	Yes			2	1	3	3		Ribeira da Aldeia	107972.2	80715.75		
736	Coa	2	2	Yes	2	Yes			2	1	3	3		Affluent river- Ribeira da Aldeia	107842	81297.96		
740	Coa	1	2	Yes	1	Yes			2	1	3	3			86438.4	148833.9		
741	Coa	1	2	Yes	1	Yes			2	1	3	3			86702.6	146391.2		
745	Coa	1	2	Yes	1	Yes			2	1	3	3			86330.08	147323.1		
771	Coa	1	2	Yes	1	Yes			2	1	3	3			103038.5	68208.19		
772	Coa	1	2	Yes	1	Yes			2	1	3	3			102855.2	68312.1		
773	Coa	1	2	Yes	1	Yes			2	1	3	3			94203.27	87620.91		
774	Coa	1	2	Yes	1	Yes			2	1	3	3			94516.95	88166.26		
775	Coa	1	2	Yes	1	Yes			2	1	3	3			94454.69	88670.6		
776	Coa	1	2	Yes	1	Yes			2	1	3	3			94636.91	88907.74		
777	Coa	1	2	Yes	2	Yes			2	1	3	3			94776.9	89144.11		
778	Coa	1	2	Yes	1	Yes			2	1	3	3			96364.99	90666.62		

779	Coa	1	2	Yes	1	Yes			2	1	3	3			95359.67	90333.88		
781	Coa	1	2		2	Yes			2	1	3	3			96840.33	91398.77		
782	Coa	1	2	Yes	1	Yes			2	1	3	3			97033.17	91442.44		
783	Coa	1	2	Yes	1	Yes			2	1	3	3			97753.83	92206.48		
785	Coa	1	2	Yes	1	Yes			2	1	3	3			97955.63	92564.08		
787	Coa	1	2	Yes	1	Yes			2	1	3	3			98308.45	93410.48		
788	Coa	1	2	Yes	1	Yes			2	1	3	3			99389.12	94967.45		
789	Coa	1	2	Yes	1	Yes			2	1	3	3			100356.2	96275.2		
790	Coa	1	2	Yes	1	Yes			2	1	3	3			100553	96531.1		
791	Coa	1	2	Yes	1	Yes			2	1	3	3			101680.4	98022.6		
792	Coa	1	2	Yes	1	Yes			2	1	3	3			100915.3	96887.06		
794	Coa	1	2	Yes	1	Yes			2	1	3	3			101593.2	98822.57		
795	Coa	1	2	Yes	1	Yes			2	1	3	3			101651.6	98992.18		
796	Coa	1	2	Yes	1	Yes			2	1	3	3			101647.5	99098.66		
797	Coa	1	2	Yes	1	Yes			2	1	3	3			101421.4	99211.57		
820	Coa	1	2	Yes	1	Yes			2	1	3	3			103134.7	109376.1		
821	Coa	1	2	Yes	1	Yes			2	1	3	3			98044.88	121581.7		
1371	Coa	1	2	Yes	1	Yes			2	1	3	3			94098.23	86006.24		
1372	Coa	1	2	Yes	1	Yes			2	1	3	3			94060.68	85865.37		
1373	Coa	1	2	Yes	1	Yes	Yes		2	1	3	3			94079.4	85667.88		
1374	Coa	1	2	Yes	1	Yes			2	1	3	3			94116.76	85471.06		
1375	Coa	1	2	Yes	1	Yes			2	1	3	3			94092.98	85196.86		
1491	Coa	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Ribeira do Boi	93265.92	86709.35		
1492	Coa	2	2		1	Yes			2	1	3	3		Affluent river	92171.6	86932.51		
1493	Coa	2	2	Yes	1	Yes			2	1	3	3		Affluent river	91619.97	86559.86		
1494	Coa	2	2	Yes	1	Yes			2	1	3	3		Affluent river	91058.09	86430.8		
1608	Coa	2	2	Yes	1	Yes	2	2	2	1	3	3			0	0		2

## Senhor de Monforte dam


Table 16: Senhor de Monforte Dam characteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Landfill	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	20	1100	Concrete	Energy	440	78	1	87.3 x 1000	35.9 x 1000

Source: [http://cnpgeb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpgeb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Vascoveiro dam


Table 17: Vascoveiro Dam characteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Landfill	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	23	110	Landfill	Water supply	594.5	248	7	3000 x 1000	2400 x 1000

Source: [http://cnpgeb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpgeb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Cerejo/ Bouça cova Dam


Table 18: Cerejo/ Bouça cova Dam characteristics.

Infraestrutura	Height (m)	Watershed area (km <sup>2</sup> )	Landfill	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	23	-	Landfill	Irrigation	-	323	7	-	-

Source: [http://cnpgeb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpgeb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Alfaiates dam

Table 19: Alfaiates Dam characteristics


Infraestrutura	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	20	20	Landfill	Irrigation	804	206	6	854 x 1000	650 x 1000

Source: [http://cnpgeb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpgeb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Sabugal Dam



Table 20: Sabugal Dam characteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	58.5	130	Landfill	Water supply, energy and Irrigation	794	1005	-	114300 x 1000	10400 x 1000

Source: [http://cnpgb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpgb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.

Table 21: Pictures of the obstacles seen in field in Côa sub-basin.

Obstacles seen in field			
360	361	362	364
			

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375



377



380



670



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674



683



719



771



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778



779



781



814



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1232

1374

1608

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The Corgo tributary (**Figure 10**) presents 62 obstacles. Of these, two are large infrastructures. **Table 22** shows the characteristics collected at the time of the inventory, the caption is in **Annex I. Table 23 and 24** shows the specific characteristics of the large dams. In **table 22**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 25**.

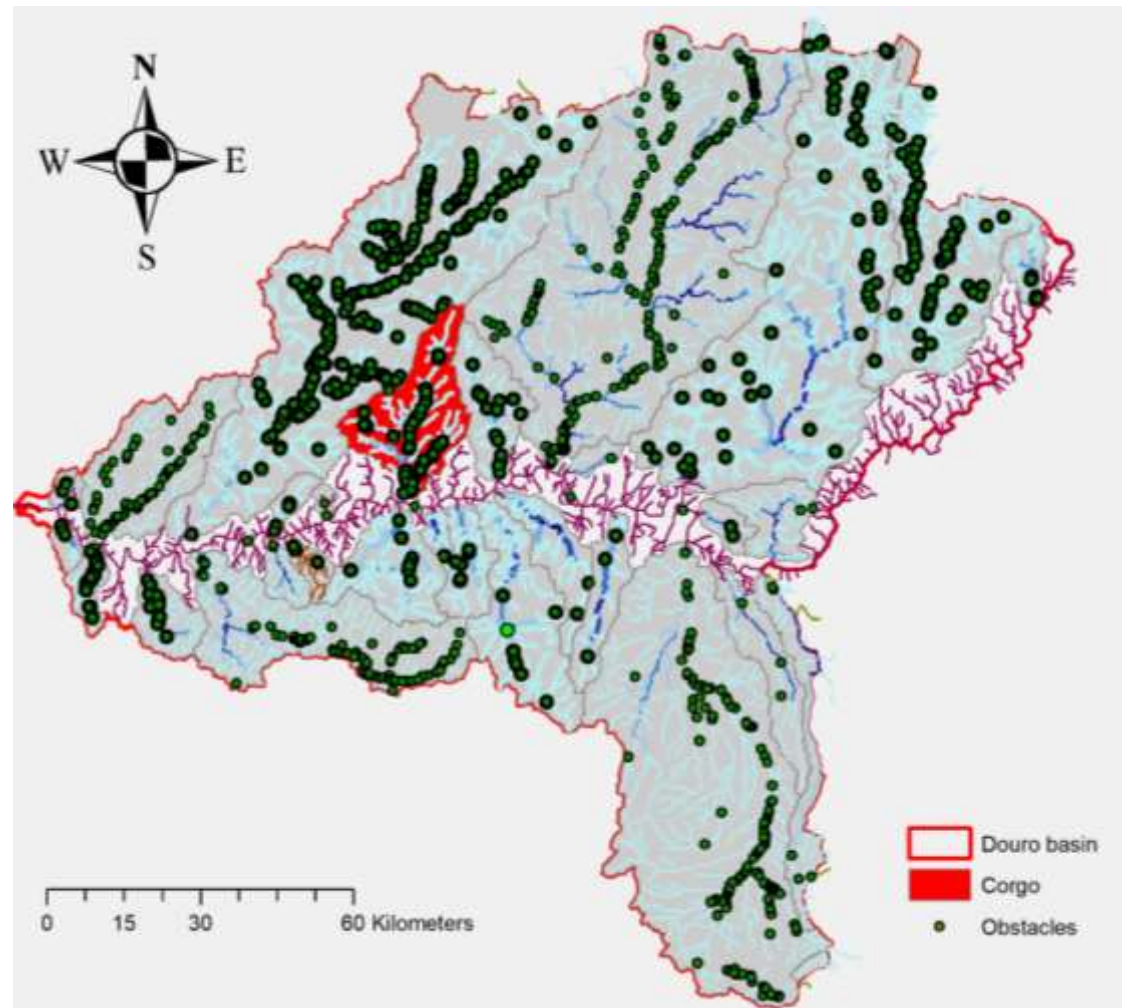


Figure 10: Highlight the Corgo river sub-basin.

Table 22: Obstacles characteristics in Corgo sub-basin.


Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
1436	Corgo	1	2	Yes	1	Yes			2	4	3	3			33790.13	181905		
1437	Corgo	1	2	Yes	1	Yes			2	4	3	3			35139.05	185304.7		
1438	Corgo	1	2	Yes	1	Yes	Yes		2	4	3	3			35194.92	186818.3		
1439	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river-Rio Tanha	32509.71	168336.7		
1442	Corgo	2	2		2	Yes			2	4	3	3		Affluent river	33667.28	170631.2		
1447	Corgo	2	2		1	Yes			2	4	3	3		Affluent river-Ribeira de Tanha	34392.74	172341.9		
1448	Corgo	2	2	Yes	1	Yes			2	4	3	3		Affluent river-Ribeira de Tanha	34666.98	172714.8		
1449	Corgo	2	2	Yes	1	Yes			2	4	3	3		Affluent river-Ribeira de Tanha	38057.51	176443.6		
473	Corgo	1	2		1	Yes			2	1	3	3			31355.54	169817.8		
479	Corgo	1	2	Yes	1	Yes			2	4	4	4			35205.84	184941.4		
480	Corgo	1	2	Yes	1	Yes			2	4	3	3			35254.03	186137.9		
478	Corgo	1	2		2	Yes			2	4	3	3			33277.22	181734.4		
477	Corgo	1	2		2	Yes			2	4	3	3			33373.25	181628.2		
483	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river-Rio Tanha.	32730.66	168937.9		
481	Corgo	1	2	Yes	2	Yes			2	1	3	3			37568.91	193278.4		
485	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river-Ribeira de Tanha.	34919.05	172933.5		
486	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river-Ribeira de Tanha.	36509.09	174193.9		
487	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river-Ribeira de Tanha.	36565.67	174363.8		
488	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river-Ribeira de Tanha.	37256.23	175955.9		

484	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Ribeira de Tanha.	34784.39	172757.8		
1238	Corgo	1	2		1	Yes			2	1	3	3			35060.26	184584.9		
577	Corgo	1	2		2	Yes			2	4	3	3			32913.83	180923.2		
474	Corgo	1	2	Yes	1	Yes			2	1	3	3			31838.62	175474.9		
475	Corgo	1	2	Yes	2	Yes			2	1	3	3			31975.72	177936.6		
476 - Terragid o dam	Corgo	1	1		2	Yes			2	1	3	3	5	Terragido Mini-hydro. Fish passage.	32120.77	179770.4	S	2
489 - Sordo dam *	Corgo	2	1		2	Yes			2	1	3	3	5	Sordo dam. Rio Sordo- Affluent river. supply and energy	28839.09	177907.5		1
1440	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tanha	32518.8	167692.1		
1441	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tanha	32074.51	167106.6		
1443	Corgo	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Tanha	33773.23	170785.6		
1444	Corgo	2	2	Yes	1	Yes			2	4	3	3		Affluent river	33901.6	170949.8		
1445	Corgo	2	2		1	Yes			2	1	3	3		Affluent river- Ribeira de Tanha	34050.51	170968		
1446	Corgo	2	2	Yes	1	Yes			2	4	3	3		Affluent river- ribeira de Tanha	34233.67	171606.8		
1234	Corgo	1	2	Yes	1	Yes			2	1	3	3			31141.1	171149.5		
1235	Corgo	1	2	Yes	2	Yes			2	4	3	3			33079.73	181019.8		
1236	Corgo	1	2	Yes	2	Yes			2	4	3	3			33914.32	182181.7		
1237	Corgo	1	2	Yes	2	Yes			2	4	3	3			34367.83	183296.5		
1240	Corgo	1	2	Yes	1	Yes			2	4	3	3			35298.66	186029		
1241	Corgo	1	2	Yes	1	Yes			2	1	3	3			35210.27	186892.9		
1242	Corgo	1	2	Yes	1	Yes			2	1	3	3			35229.54	186986.7		
1243	Corgo	1	2		1	Yes			2	4	3	3			35112.87	187226.2		
1244	Corgo	1	2	Yes	1	Yes			2	1	3	3			37595.78	193897.4		
1241	Corgo	1	2	Yes	1	Yes			2	1	3	3			35210.27	186892.9		
1242	Corgo	1	2	Yes	1	Yes			2	1	3	3			35229.54	186986.7		
1243	Corgo	1	2		1	Yes			2	4	3	3			35112.87	187226.2		

1244	Corgo	1	2	Yes	1	Yes			2	1	3	3			37595.78	193897.4		
1245	Corgo	1	2	Yes	1	Yes			2	1	3	3			37788.29	193709.8		
1296	Corgo	1	2	Yes	1	Yes			2	4	3	3			30720.2	166731.1		
1297	Corgo	1	2	Yes	1	Yes			2	4	3	3			31465.39	168605.6		
1298	Corgo	1	2	Yes	1	Yes			2	4	3	3			32676.81	180654.1		
1299	Corgo	2	2	Yes	1	Yes			2	4	3	3			23677.37	179851.4		
1300	Corgo	2	2	Yes	1	Yes			2	4	3	3			23340.44	180017.9		
1301	Corgo	2	2	Yes	1	Yes			2	4	3	3			23042.8	180125.1		
1303	Corgo	2	2	Yes	1	Yes			2	1	3	3			23067.17	182600.2		
1474	Corgo	1	2	Yes	1	Yes			2	4	3	3			31072.25	170251.1		
1475	Corgo	1	2	Yes	1	Yes			2	4	3	3			31358.02	169105.6		
1503	Corgo	2	2	Yes	1	Yes			2	4	3	3		Affluent river	32458.41	167870.3		
1504	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river	32353.68	167304		
1505	Corgo	2	2	Yes	1	Yes			2	4	3	3		Affluent river	32310.02	167553.4		
1506	Corgo	2	2	Yes	1	Yes			2	4	3	3		Affluent river	32536.88	168752.2		
1507	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river	34161.7	171192.4		
1508	Corgo	2	2	Yes	2	Yes			2	1	3	3		Affluent river	34740.22	173196.8		
1509	Corgo	2	2	Yes	1	Yes			2	1	3	3		Totally destroyed	37629.95	176133.6		
1510	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river	37736.78	176290.5		
1511	Corgo	2	2	Yes	1	Yes			2	1	3	3		Affluent river	38496.75	176840		
1512	Corgo	1	2	Yes	1	Yes			2	1	3	3			31932.13	175705.7		
1239	Corgo	1	2	Yes	1	Yes			2	4	3	3			35161.3	186590		

## Terragido Mini Hydro


Table 23: Terragido Mini Hydro characteristics

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	5	-	Concrete	Energy	-	50	-	-	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Sordo dam

Table 24: Sordo Dam characteristics.













Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	36	48	Concrete	Water supply and Energy	527	108	6	1000 x 1000	850 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.



Table 25: Pictures of the obstacles seen in field in Corgo sub-basin.

Obstacles seen in field			
474	476	477	478
			
489	1238	1234	1296
			
1299	1300	1301	1400
			
1441	1446	1504	1509



The Febros tributary (**Figure 11**) presents 4 obstacles. Of these, two are large infrastructures. **Table 26** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**. In **table 26**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 27**.

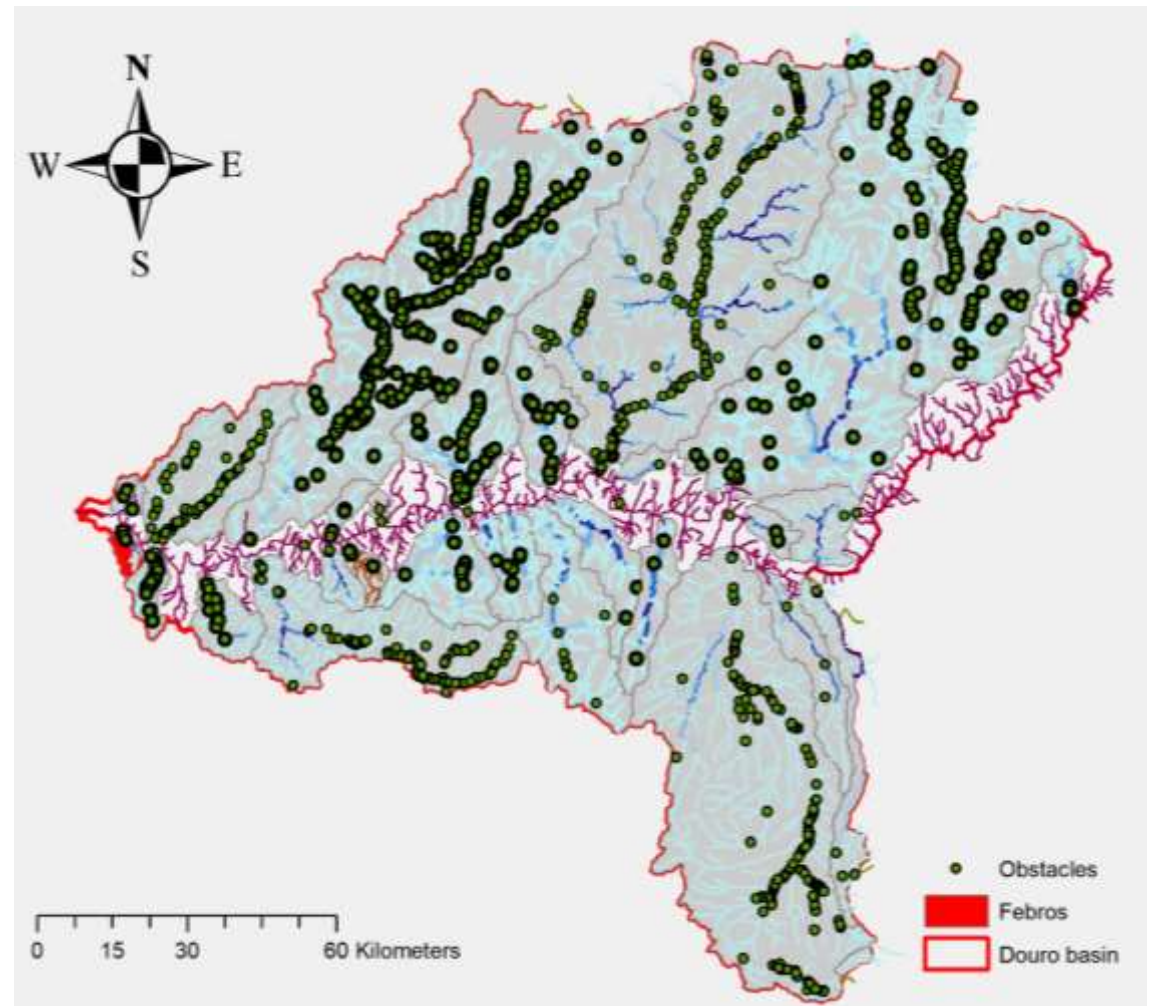


Figure 11: Highlight the Febros river sub-basin.

Table 26: Obstacles characteristics in Febros sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
1378	Febros	1	2	Yes	1	Yes			2	4	3	3			-36309.8	160375.7		
1379	Febros	1	2	Yes	1	Yes			2	4	3	3			-36114.1	159431.8		
1380	Febros	1	2	Yes	1	Yes			2	4	3	3			-36003.5	159365.2		
1382	Febros	1	2	Yes	1	Yes			2	4	3	3			-35658.7	158635.2		

Table 27: Picture of the obstacle seen in field in Febros sub-basin

Obstacles seen in field	
1380	
	



The Freixo tributary (**Figure 12**) presents two obstacles. Of these, one are a large infrastructures. **Table 28** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**. **Table 29** shows the specific characteristics of the large dams.

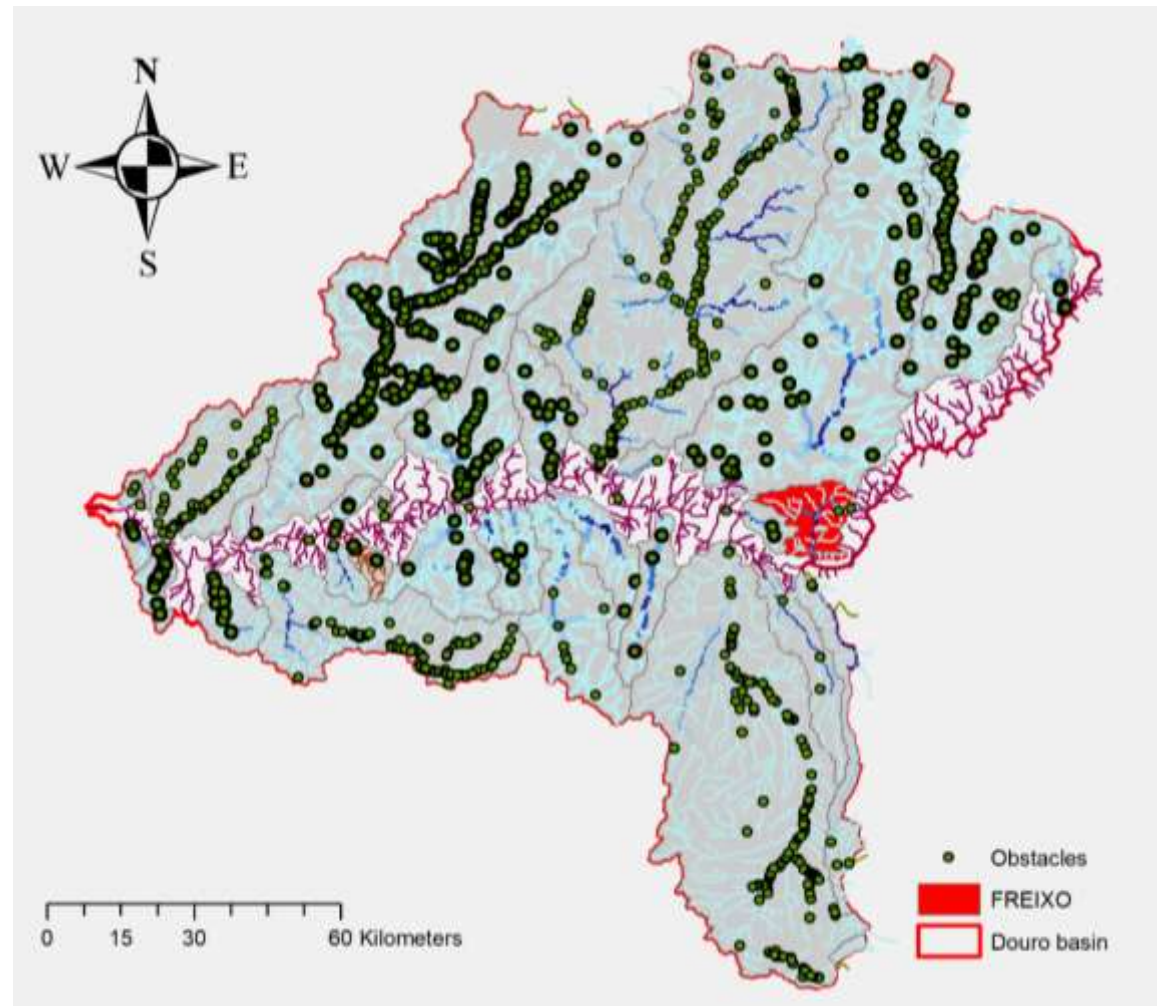



Figure 12: Highlight the Freixo river sub-basin.

Table 28: Obstacles characteristics in Freixo sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
Ferradosa dam*	Ribeira do Freixo	1	1		2	Yes			2	1	3	3		Ferradosa dam	108627.6	163374.7		2
1384	Ribeira do Freixo	2	2	Yes	1	Yes			2	1	3	3		Affluent river	111078.3	163880.5		

## Ferradosa dam

Table 29: Ferradosa Dam characteristics.

Infraestructure	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	30	-	Concrete	Water supply	-	108	6	-	-

Source: [http://cnpgeb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpgeb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.

The Fresno tributary (**Figure 13**) presents 9 obstacles. Of these, all are weirs. **Table 30** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**. In **table 30**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 31**.

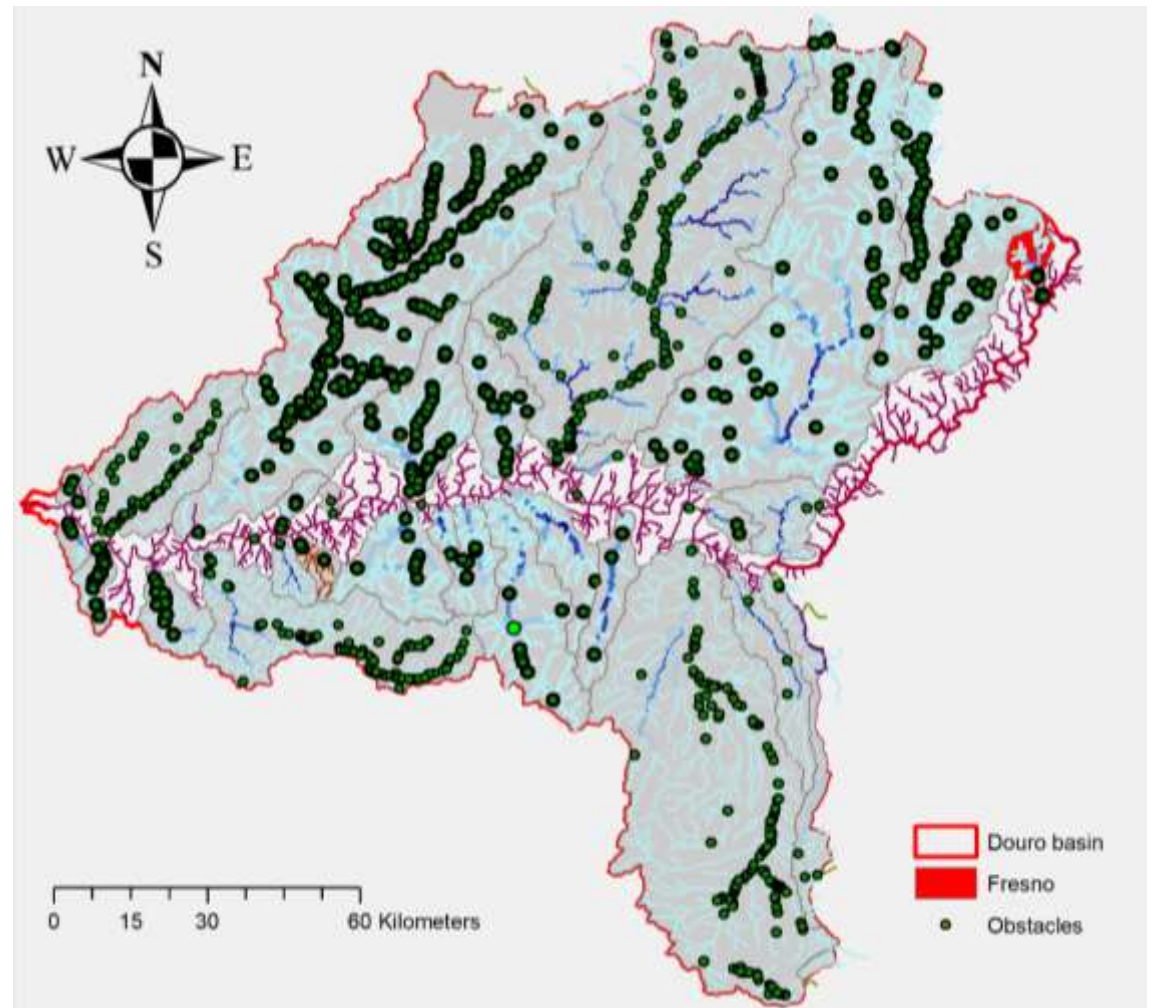


Figure 13: Highlight the Fresno river sub-basin.



Table 30: Obstacles characteristics in Fresno sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
543	Fresno	1	1	Yes	2	Yes			2	4	3	3			154892.3	204841.7		1
544	Fresno	1	1	Yes	2	Yes			2	4	3	3			154996.3	204844.6		1
546	Fresno	1	2	Yes	2	Yes			2	4	3	3			154954.2	205436.8		
547	Fresno	1	2	Yes	1	Yes			2	1	3	3			154010.6	209184.9		
542	Fresno	1	1	Yes	2	Yes			2	4	3	3			154788.8	204635.2		1
545	Fresno	1	1	Yes	2	Yes			2	4	3	3			155189.1	204970.8		1
1495	Fresno	1	2	Yes	1	Yes			2	1	3	3			154079.2	209313.1		
1385	Fresno	1	2	Yes	1	Yes			2	1	3	3			153929.8	208595.6		
1386	Fresno	1	2	Yes	1	Yes			2	1	3	3			153933.9	208733.6		

Table 31: Pictures of the obstacles seen in field in Fresno sub-basin.

Obstacles seen in field	
547	1385
	

The Ovil tributary (**Figure 14**) presents 7 obstacles. Of these, one is a mini hydro. **Table 32** shows the characteristics collected at the time of the inventory, the caption is in **Annex I. Table 33** shows the specific characteristics of the large dams.

In **Table 32**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **Table 34**.

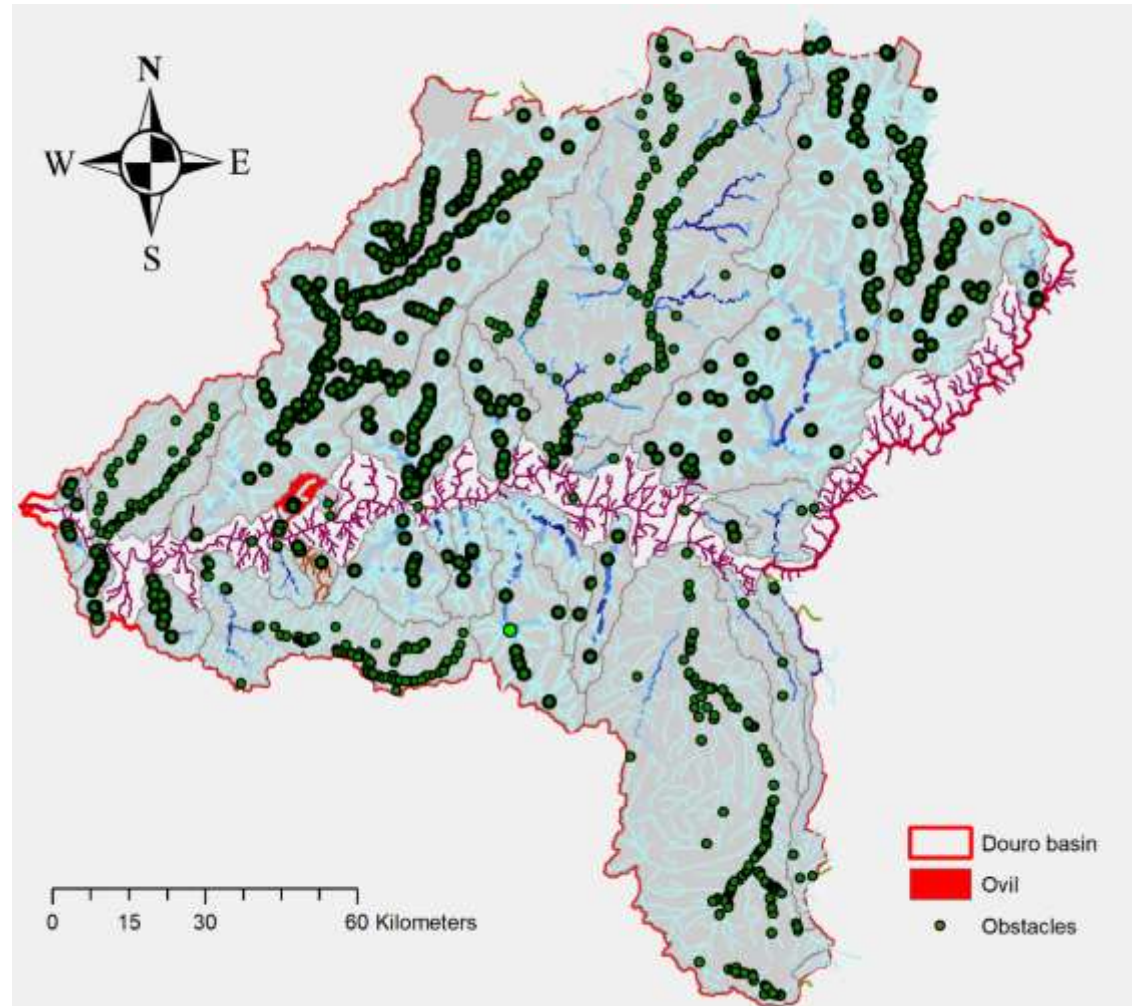



Figure 14: Highlight the Ovil river sub-basin.

Table 32: Obstacles characteristics in Ovil sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
492	Ovil	1	2	Yes	1	Yes			2	1	3	3			5627.771	159826		
494	Ovil	1	2	Yes	1	Yes			2	1	3	3			8410.642	164725.2		
493	Ovil	1	2	Yes	1	Yes			2	1	3	3			5742.15	160298.4		
491- Ribadouro mini hydro	Ovil	1	1	Yes	2	Yes			2	1	3	3	5	Mini-hydro Ribadouro	5434.632	159312		2
1387	Ovil	1	2	Yes	1	Yes			2	1	3	3			8270.683	164435.2		
1388	Ovil	1	2	Yes	1	Yes			2	1	3	3			8273.554	164338.6		
1389	Ovil	1	2	Yes	1	Yes			2	1	3	3			8259.765	164269		

#### Ribadouro mini-hydro

Table 33: Ribadouro Mini hydro characteristics.

Infraestructure	Height (m)	Watershed area (km²)	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m³)	Useful capacity (m³)
	7	-	Concrete	Energy	-	30.71	-	-	-

Source: [http://cnpbg.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpbg.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

Table 34: Picture of the obstacle seen in field in Ovil sub-basin

Obstacles seen in field		
491	1389	
		

The Paiva tributary (**Figure 15**) presents 119 obstacles. Of these, 4 are for hydroelectric use. **Table 35** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

In **table 35**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 36**.

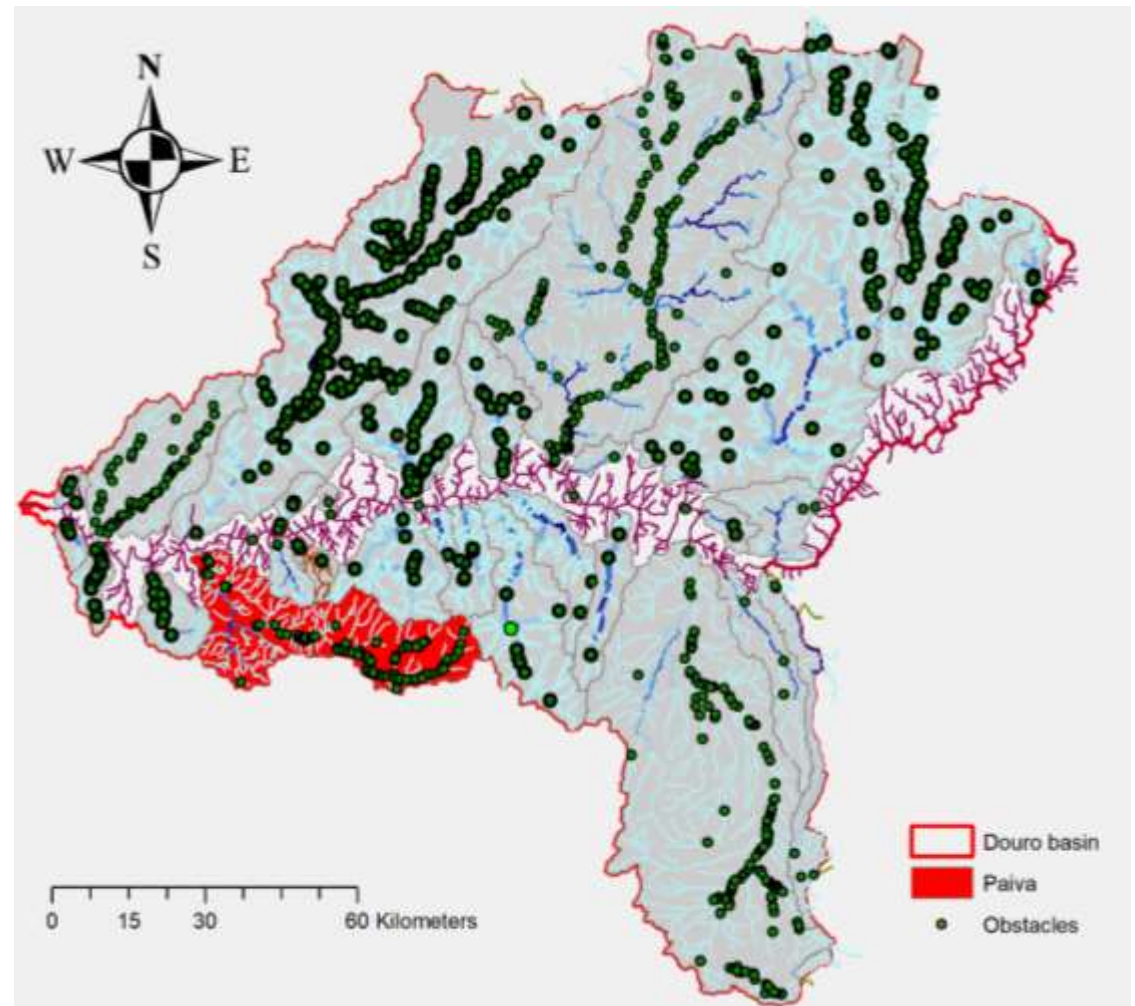


Figure 15: Highlight the Paiva river sub-basin.

Table 35: Obstacles characteristics in Paiva sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
1188	Paiva	1	2		1				2	1	3	3		semi-disaggregated	38270.22	132939.9		
332	Paiva	1	2	Yes	1	Yes			2	4	3	3			17363.91	135477.5		
336	Paiva	1	2	Yes	2	Yes			2	4	3	3			23185.26	133927.1		
327	Paiva	2	2		2	Yes			2	1	3	3		Affluente river. Rio Paivô.	-1959.31	129333		
331	Paiva	2	2	Yes	2	Yes			2	1	3	3		Affluente river Rio Ardena.	-4731.85	147955.7		
333	Paiva	1	2	Yes	2	Yes			2	4	3	3			19222.35	135515.9		
335	Paiva	1	2	Yes	2	Yes			2	4	3	3			22824.84	134296.9		
337	Paiva	1	2	Yes	1	Yes			2	4	3	3			22841.78	132079.7		
344	Paiva	1	2	Yes	2	Yes			2	4	3	3			30909.8	129814.6		
338	Paiva	1	2	Yes	2	Yes			2	1	3	3			23105.32	131286.9		
339	Paiva	1	2	Yes	1	Yes			2	1	3	3			23542.52	131082.1		
340	Paiva	1	2	Yes	1	Yes			2	1	3	3			24173.84	130928		
341	Paiva	1	2	Yes	1	Yes			2	1	3	3			25036.87	130736.3		
342	Paiva	1	2	Yes	1	Yes			2	1	3	3			25457.96	130826.3		
343	Paiva	1	2	Yes	1	Yes			2	1	3	3			28895.9	129762.9		
345	Paiva	1	2	Yes	1	Yes			2	4	3	3			31231.26	129801.7		
1450	Paiva	1	2	Yes	2	Yes			2	4	3	3			-8959.22	150854.7		
1451	Paiva	1	2	Yes	1	Yes			2	4	3	3			18541.32	135611.7		
346 -Mini-hydro Vale do Soeiro*	Paiva	1	1	Yes	2	Yes			2	4	3	3	5	With fish passage	16044.27	136711.8	S	2
347 - Fráguas Mini-hydro	Paiva	1	1	Yes	2	Yes			2	1	3	3	5	With fish passage	29416.67	129995.6	S	2
334	Paiva	1	2	Yes	1	Yes			2	4	3	3			22553.57	134493.6		
1452	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river. - Rio Covo	28039.02	130978.4		
1453	Paiva	2	2	Yes	2	Yes			2	1	3	3		Affluente river. - Rio Covo	28351.35	133597.2		
1454	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river. - Rio Covo	28398.47	133879.7		



1455	Paiva	1	2	Yes	1	Yes			2	1	3	3			31591.13	129769.7		
81	Paiva	1	2		1	Yes			2	1	3	3			34395.77	130698.1		
583	Paiva	1	2		1	Yes			2	4	3	3			-8805.75	150937.6		
584	Paiva	1	2	Yes	1	Yes			2	4	3	3			-8446.89	150476.3		
83	Paiva	1	2	Yes	2	Yes			2	1	3	3			34038.64	130402.9		1
73	Paiva	1	2		2	Yes			2	4	3	3			38024.16	132660.3		
580	Paiva	1	2	Yes	1	Yes			2	4	3	3			-8777.68	153649.6		
581	Paiva	1	2	Yes	1	Yes			2	4	3	3			-8308.14	153119.2		
582	Paiva	1	2	Yes	1	Yes	Yes		2	1	3	3		With fish passage	-8228.71	152647.7	S	
587	Paiva	1	2	Yes	1	Yes			2	1	3	3			1176.879	140176.5		
588	Paiva	1	2	Yes	1	Yes			2	1	3	3			1196.002	140380.4		
589	Paiva	1	2	Yes	1	Yes			2	1	3	3			1679.187	140665.4		
598	Paiva	1	2	Yes	1	Yes			2	1	3	3			9218.194	138187.8		
599	Paiva	1	2	Yes	1	Yes			2	1	3	3			9376.474	138543.3		
600	Paiva	1	2	Yes	1	Yes			2	1	3	3			9788.22	137919.2		
86	Paiva	1	2		1	Yes			2	1	3	3			40756.9	135627		1
88	Paiva	1	2		1	Yes			1	1	3	3			39963.16	134085.1		1
601	Paiva	1	2	Yes	2	Yes			2	1	3	3			10111.3	137695.8		
603	Paiva	1	2	Yes	1	Yes			2	1	3	3			10495.84	137463.5		
605	Paiva	1	2	Yes	1	Yes			2	1	3	3			10716.13	137550.1		
606	Paiva	1	2	Yes	1	Yes			2	1	3	3			10732	138064		
610	Paiva	1	2		1	Yes			2	1	3	3			11931.19	137939.6		
612	Paiva	1	2	Yes	1	Yes			2	1	3	3			12224.83	138230.2		
613	Paiva	1	2	Yes	1	Yes			2	1	3	3			12581.04	138424.4		
620	Paiva	1	2	Yes	1	Yes			2	4	3	3			17041.26	135684.4		
621	Paiva	1	2	Yes	1	Yes			2	4	3	3			17148.34	135601		
622	Paiva	1	2	Yes	1	Yes			2	4	3	3			18076.95	135559		
624	Paiva	1	2	Yes	1	Yes			2	4	3	3			18904.51	135399.3		
625	Paiva	1	2	Yes	1	Yes			2	4	3	3			19698.1	135426.6		
626	Paiva	1	2	Yes	1	Yes			2	4	3	3			19842.16	135219.7		
628	Paiva	1	2	Yes	1				2	1	3	3			21145.3	134757.1		
642	Paiva	1	2	Yes	1	Yes			2	1	3	3			23900.98	130975.5		
74	Paiva	1	2		1	Yes			1	2	3	3			37963.47	132473.2		
633	Paiva	1	2	Yes	1	Yes			2	4	3	3			23531.51	133209.5		
636	Paiva	1	2		1	Yes			2	4	3	3			22887.78	132343.3		
638	Paiva	1	2	Yes	1	Yes			2	1	3	3			23114.9	131562.6		
640	Paiva	1	2	Yes	1	Yes			2	1	3	3			23813.89	131337.4		
641	Paiva	1	2	Yes	1	Yes			2	1	3	3			24080.96	131306.9		















643	Paiva	1	2	Yes	1	Yes			2	1	3	3			26071.48	130417		
644	Paiva	1	2	Yes	1	Yes			2	1	3	3			26910.27	130454.3		
646	Paiva	1	2	Yes	1	Yes			2	1	3	3			27875.71	130155.9		
647	Paiva	1	2	Yes	1	Yes			2	1	3	3			28409.36	129942.4		
648	Paiva	1	2	Yes	1	Yes			2	1	3	3			29219.64	129845.9		
78	Paiva	1	2		2	Yes			2	1	3	3			37274.25	131462		2
79	Paiva	1	2		1	Yes			2	1	3	3			35629.92	130880.3		
80	Paiva	1	2		2	Yes			2	1	3	3			34568.25	130783.7		1
90	Paiva	1	2		1	Yes			2	1	3	3			38597.18	133480.4		1
91	Paiva	1	2		1				2	1	3	3			38524.15	133369.9		
210	Paiva	1	2	Yes	2	Yes			2	1	3	3			30663.37	129838.1		
217- hydroelec tric use of Ermida	Paiva	2	1	Yes	2	Yes			2	1	3	3	5		16724.43	140428.6		2
348-Mini- hydro Vila Viçosa	Paiva	2	1	Yes	2	Yes			1	1	3	3	5		-6506.68	147387.5		2
1190	Paiva	2	2		1	Yes			2	1	3	3			37938.44	132009.3		
1529	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	21565.37	135488.3		
1530	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	24565.05	137173.3		
1531	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	28658.4	134527.2		
1532	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	30337.29	136381.9		
1533	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	30482.89	136424.6		
1534	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	29949.53	136054.9		
1535	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	28662.86	127969.1		
1536	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	18713.12	136908.8		
1537	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	30647.31	136623.9		
1538	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	32244.85	136313.7		
1539	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	33258	136219.6		
1540	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	34484.63	137329.3		
632	Paiva	1	2	Yes	1	Yes			2	4	3	3			23619.92	133435.4		
590	Paiva	1	2	Yes	1	Yes			2	1	3	3			4712.209	140549.7		
591	Paiva	1	2	Yes	1	Yes			2	1	3	3			5853.913	138866.8		
593	Paiva	1	2	Yes	1	Yes			2	1	3	3			7048.645	138735.4		
629	Paiva	1	2	Yes	1	Yes			2	4	3	3			21528.49	134770.2		
630	Paiva	1	2	Yes	1				2	1	3	3			21135.09	134688.3		
649	Paiva	1	2	Yes	1	Yes			2	1	3	3			29361.07	129970.1		
653	Paiva	1	2	Yes	1	Yes			2	1	3	3			31717.56	129738.5		

655	Paiva	1	2	Yes	1	Yes			2	1	3	3			32145.34	129784.2		
657	Paiva	1	2	Yes	2	Yes			2	1	3	3			32357.9	129825		
662	Paiva	1	2	Yes	1	Yes			2	1	3	3			33594.75	130112.8		
663	Paiva	1	2		2	Yes			2	1	3	3			37940.38	132136.6		
664	Paiva	1	2	Yes	2	Yes			2	1	3	3			37978.5	132305.5		
1140	Paiva	1	2	Yes	1	Yes			2	4	3	3			-8188.43	152902.6		
1186	Paiva	1	2		1				2	1	3	3			41815.28	139334.8		
1187	Paiva	1	2		1				2	1	3	3			41820.22	139280.5		
1191	Paiva	1	2		1				2	1	3	3			37937.26	131931.5		
1192	Paiva	1	2		1				2	1	3	3			41338.12	136925		
1193	Paiva	1	2		1				2	1	3	3			40819.66	135414.2		
1433	Paiva	2	2	Yes	2	Yes			2	1	3	3		Rio Ardena	-4636.93	147873.6		
1541	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	33969.43	137105		
1542	Paiva	2	2	Yes	1	Yes			2	1	3	3		Affluente river.	31227.38	136257.5		
1194	Paiva	1	2		1				2	1	3	3			38659.71	133775		
1615	Paiva														0	0		2
1616	Paiva														0	0		
1617	Paiva														0	0		
1618	Paiva														0	0		
1619	Paiva														0	0		
1620	Paiva														0	0		
1621	Paiva														0	0		
1622	Paiva	2	2	yes	2	yes	2	2	2	1	3	3			0	0		2

\* The barriers identified are shown in Table 96, showing more details of data about them.

Table 36: Pictures of the obstacles seen in field in Paiva sub-basin

Obstacles seen in field			
73	74	83	86
			
210	217	331	333
			
346	347	348	582
			
586	610	623	624



**1433**



**1454**



**1538**



**1615**



**1622**





The Pinhão tributary (**Figure 16**) presents 20 obstacles. Of these, two are large infrastructures. **Table 37** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

**Table 38** and **39** shows the specific characteristics of the large dams.

In **table 37**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 40**.

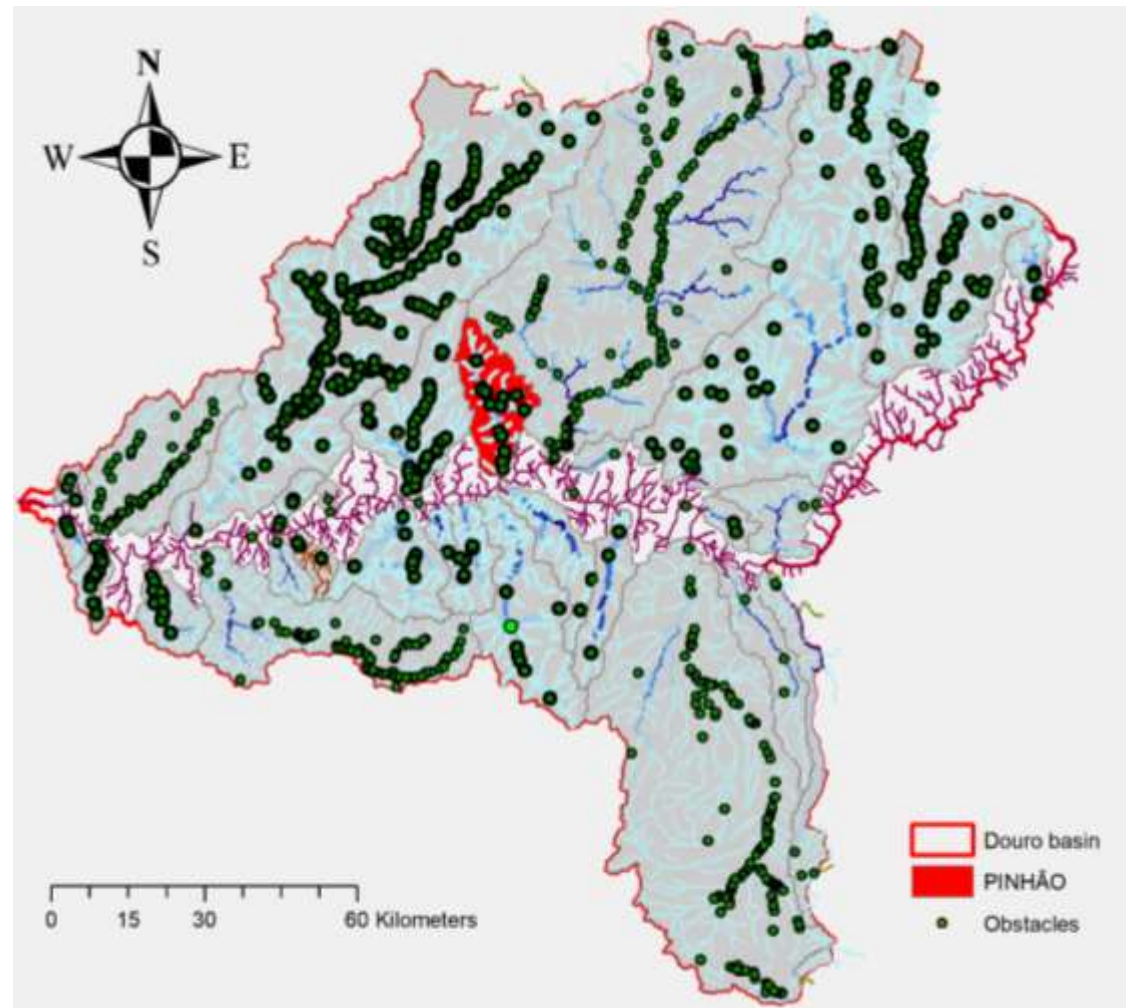



Figure 16: Highlight the Pinhão river sub-basin.

Table 37: Obstacles characteristics in Pinhão sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
6	Pinhao	1	2	Yes	1	Yes			2	1	3	3			49792.97	172671.4		
8	Pinhao	1	2	Yes	1	Yes			2	1	3	3			49817.2	173264.8		
3	Pinhao	1	2	Yes	2	Yes			2	1	3	3			49684.92	170801.1		
11	Pinhao	1	2		2	Yes	Yes		2	1	3	3			49963.11	174228.1		
28	Pinhao	1	2	Yes	1	Yes	Yes		2	1	3	3			46121.81	185548.4		
21	Pinhao	1	2	Yes	1	Yes			2	1	3	3			49117.95	177516.2		
20	Pinhao	1	2	Yes	1	Yes			2	1	3	3			49250.51	177414.2		
34 – Pinhao dam*	Pinhao	1	1		2	Yes			2	1	3	3	2		44359.48	191952.9		2
31	Pinhao	1	2	Yes	1	Yes	Yes		2	1	3	3			45489.86	186568.8		
29	Pinhao	1	2	Yes	1	Yes			2	4	3	3			46224.47	185755.3		
56- Vila Cha dam	Pinhao	2	1		2	Yes			2	1	3	3	2		53751.17	182337.8		2
23	Pinhao	1	2		2	Yes			2	1	3	3			48817.22	178109.6		
60	Pinhao	2	2	Yes	1	Yes			2	1	3	3		Pedra. Affluent river	49163.27	183162.5		
57	Pinhao	2	2	Yes	2	Yes	Yes		2	1	3	3		Affluent river	52301.7	185148.7		
63	Pinhao	1	2	Yes	1	Yes			2	1	3	3			45486.43	186267.7		
1551	Pinhao	1	2	Yes	1	Yes			2	1	3	3			49383.92	177131.1		
1226	Pinhao	1	2	Yes	1	Yes			2	1	3	3			49393.11	172104.6		
1227	Pinhao	1	2	Yes	1	Yes	Yes		2	1	3	3			47177.01	183417.7		
1228	Pinhao	1	2	Yes	1	Yes			2	4	3	3			46110.84	185922.2		
1229	Pinhao	2	2	Yes	1	Yes			2	1	3	3			49659.48	184880.4		

## Pinhão dam


Table 38: Pinhão dam characteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Landfill	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	22	-	Landfill	Water supply and flood control	-	280	7	-	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Vila chã dam

Table 39: Vila chã dam characteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Landfill	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	40	9	Landfill	Water supply	660.9	167	6	1740 x 1000	1590 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.



Table 40: Picture of the obstacle seen in field in Pinhão sub-basin

Obstacles seen in field			
11	34	63	1228
			

The Sabor tributary (**Figure 17**) presents 147 obstacles. Of these, 12 are large infrastructures. **Table 41** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

**Table 42 and 54** shows the specific characteristics of the large dams.

In **table 41**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 55**.

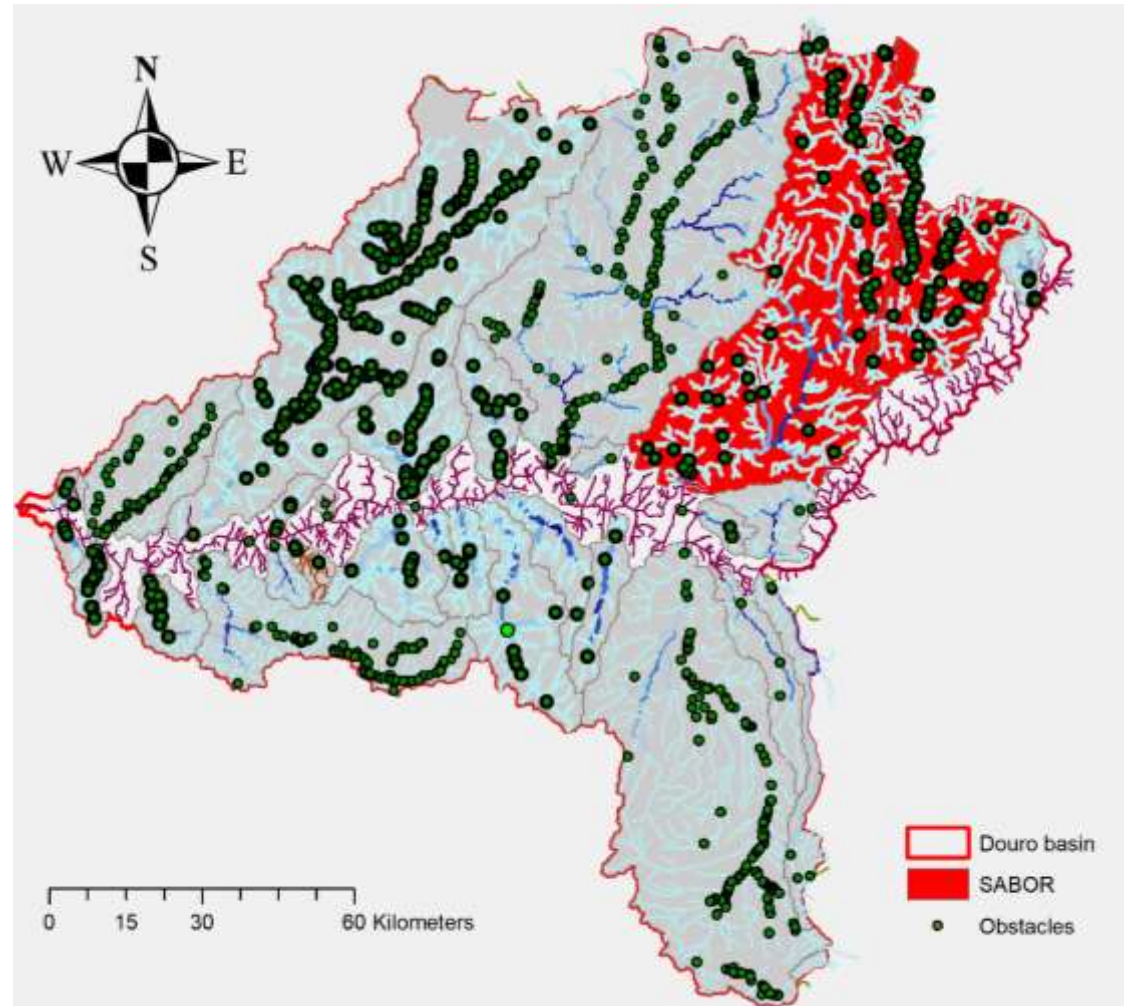


Figure 17: Highlight the Sabor river

Table 41: Obstacles characteristics in Sabor sub-basin

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
304	Sabor	2	2		2	Yes			2	1	3	3		Affluent river.Rio Agueira.	136311.6	212588.4		
303	Sabor	2	2		1	Yes			1	1	3	3		Affluent river. Rio Agueira.	136325.3	212169.1		
305	Sabor	2	2		2	Yes			2	1	3	3		Affluent river. Rio Agueira.	136734.6	212736		
320 – sabor dam *	Sabor	1	1		2	Yes			2	1	3	3		Sabor dam	87232.82	170820.7		
319	Sabor	1	1		2	Yes			2	1	3	3		Sabor dam.	93971.55	173871.7		
309	Sabor	2	2		1	Yes			2	1	4	4		Affluent river.Rio Maças	131077.7	213810.6		
325	Sabor	2	2		1	Yes			2	1	3	3		Affluent river. Rio Angueira.	138588.4	216910.3		
324	Sabor	2	2		2	Yes			2	1	3	3		Affluent river. Rio Angueira.	138621.3	216704.8		
323	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river. Rio Angueira.	138576.8	216566.7		
308	Sabor	2	2		2	Yes			2	1	3	3		Affluent river. Rio Agueira.	137455.7	214651.9		
311	Sabor	2	2		1	Yes			2	1	3	3		Affluent river. Maças.	130352.3	217553.2		
313	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river. Rio Maças.	130093.8	219740.7		
314	Sabor	2	2		1	Yes			2	1	3	3		Affluent river. Rio Maças.	130796.7	211267.1		
326	Sabor	2	2		1	Yes			2	1	3	3		Affluent river. Rio Onor.	119453.8	240228.5		
310	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river. Rio Maças.	130968	216310.8		
1593	Sabor	2	2		1	Yes			2	1	3	3		Affluent river	0	0		
1594	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	0	0		
1595	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	0	0		
1414	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river	134231.5	204649.4		

1596	Sabor	2	2	Yes	1				2	1	3	3		Affluent river	0	0		
1415	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	134534.7	206620.7		
1597	Sabor	2	2		2	Yes			2	1	3	3		Affluent river	0	0		
1598	Sabor	2	2		1	Yes			2	1	3	3		Affluent river	0	0		
155	Sabor	1	2	Yes	1	Yes			2	1	3	3			115173.1	243422.5		
1599	Sabor	2	2		2	Yes			2	1	3	3		Affluent river	0	0		
1600	Sabor	2	2		1	Yes			2	1	3	3		Affluent river	0	0		
1601	Sabor	2	2		2	Yes			2	1	3	3		Affluent river	0	0		
1602	Sabor	2	2		2	Yes			2	1	3	3		Affluent river	0	0		
1603	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river	0	0		
1604	Sabor	2	2		1	Yes			2	1	3	3		Affluent river	0	0		
1605	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river	0	0		
1606	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river	0	0		
1607	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river	0	0		
115	Sabor	2	1		2	Yes			2	1	3	3		Affluent river.	85771.53	171945.4		
117 – Valetorno *	Sabor	2	1		2	Yes			2	1	3	3		Affluent river.	78891.86	175630.9		S
133	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river.	101529.4	186666.8		
186	Sabor	2	2	Yes	2	Yes			2	1	3	3	3	Affluent river.	148616.4	221123.7		
146	Sabor	1	2	Yes	2	Yes			1	1	3	3			120700.5	236115.7		
147- Gimonde Mini- hydro	Sabor	1	1	Yes	2	Yes			2	1	3	3	5	Mini-hydro Gimonde.	119650.7	237777.9		
160-Serra Serrada dam *	Sabor	2	1		2	Yes			2	1	3	3	2	Affluent river.	112913.3	255511.3		
165	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river - Rio Angueira.	133825.8	203573.3		
135	Sabor	2	1	Yes	2	Yes			2	1	3	3		Affluent river.	123212.4	192739.2		
159	Sabor	2	1		2	Yes			2	1	3	3	5	Affluent river.	112431.3	254928		
181	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river.	139312.3	218700		
170	Sabor	2	2	Yes	1				2	1	3	3		Affluent river.	115521.2	174886		
156	Sabor	1	2	Yes	1	Yes			2	4	3	3			115026	245618.9		
176	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river. Rio Maçã	130272.9	223898.5		
177	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river. Rio Maças	130810.2	224395.7		

116- Ribeiro Grande e Arco dam *	Sabor	2	1		2	Yes			2	1	3	3		Affluent river Ribeiro Grande.	84109.47	175698.1		
124-Burga dam *	Sabor	2	1		2	Yes			1	1	3	3	1	Affluent river- Ribeira da Burga.	90679.77	191789.6		
125- Salgueiral dam*	Sabor	2	1		2	Yes			2	1	3	3	1	Affluent river.	93593.26	178111.8		
121	Sabor	2	1		2	Yes			2	1	3	3		Affluent river.	85438.32	185431		
118 – Palameiro *	Sabor	2	1		2	Yes			2	1	3	3		Affluent river.	80208.23	173753		
127- Esteveinh a dam	Sabor	2	1		2	Yes			2	1	3	3	1	Affluent river. O uso é de Abastecimento e Rega.	98478.2	189496.3		
128- Santa Justa dam*	Sabor	2	1		2	Yes			2	1	3	3	1	Affluent river- Ribeira de Santa Justa	92684.91	185174.5		
126	Sabor	2	1	Yes	2	Yes			2	1	3	3		Affluent river.	99045.07	185869.8		
322	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river. Rio Maça.	129984.4	219348.4		
1155	Sabor	1	2	Yes	1	Yes			2	4	3	3			115383.1	246259.5		
132- Azibo dam	Sabor	2	1		2	Yes			2	1	3	3	1	Affluent river- Rio Azibo.	103937.1	210491.5		
129- Salgueiro dam*	Sabor	2	1		2	Yes			2	1	3	3	1	Affluent river- Ribeira do Salgueiro.	90545.09	185808.7		
131- Camba dam	Sabor	2	1		2	Yes			2	1	3	3	1	Affluent river- Ribeira da Camba. O uso é de Rega e Abastecimento .	102951.7	198211.8		
130- Sambade dam*	Sabor	2	1		2	Yes			2	1	3	3		Affluent river- Ribeira da	96525.83	193263.5		

														Fonte do Atalho.				
306	Sabor	2	2		2	Yes			2	1	3	3		Affluent river- Rio Agueira	137105.8	212923.8		
307	Sabor	2	2		2	Yes			2	1	3	3		Affluent river- Rio Agueira.	137627.4	214363.8		
1072	Sabor	1	1		2	Yes			2	1	3	3		Barragem de Veiguihas	110198.5	254518.7		
1418	Sabor	2	2	Yes	1	Yes			2	1	3	3			130304.3	234265.2		
1419	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river- Rio Agueira	137705.9	213143.9		
1425	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river- Rio Agueira	137142	215549.3		
1426	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river	137316.1	215710.7		
1427	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river	137538	215880		
1428	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river- Rio Agueira	138245.1	216418.8		
1429	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	138400.8	217461.7		
1141	Sabor	1	2	Yes	1	Yes			2	1	3	3			122806.4	203696.5		
1142	Sabor	1	2	Yes	1	Yes			2	1	3	3			122039.5	204933.9		
1143	Sabor	1	2	Yes	1	Yes			2	1	3	3			121892.5	205953.7		
1145	Sabor	1	2	Yes	1	Yes			2	1	3	3			122293.6	207270.3		
1146	Sabor	1	2	Yes	1	Yes			2	1	3	3			121500.4	211695		
1147	Sabor	1	2	Yes	1	Yes			2	1	3	3			121865.8	212794.9		
1148	Sabor	1	2	Yes	1	Yes			2	1	3	3			124285.1	220648.9		
1149	Sabor	1	2	Yes	1	Yes			2	1	3	3			124347.7	221698.9		
1150	Sabor	1	2	Yes	1	Yes			2	1	3	3			124050.5	222827		
1152	Sabor	1	2	Yes	1	Yes			2	1	3	3			123190.1	227160.8		
1153	Sabor	1	2	Yes	1	Yes			2	1	3	3			122279.1	229157.9		
1154	Sabor	1	2	Yes	2	Yes			2	4	3	3			118800.2	237153.1		
1156	Sabor	1	2	Yes	2	Yes			2	4	3	3			116660.1	249345.9		
1157	Sabor	1	2	Yes	1	Yes			2	4	3	3			116141.2	249063.8		
1158	Sabor	1	2	Yes	1	Yes			2	4	3	3			115160.5	248684.7		
1159	Sabor	2	2	Yes	2	Yes			2	4	3	3		Affluent river- Rio Onor	125762.4	253210.3		
1160	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Onor	125800.1	253528.8		
1161	Sabor	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Onor	125413.6	253793.3		

1162	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river- Rio Igrejas	120174.6	244054		
1163	Sabor	2	2	Yes	2	Yes			2	4	3	3		Affluent river- Rio Igrejas	120695.3	245481.4		
1164	Sabor	2	2	Yes	2	Yes			2	4	3	3		Affluent river- Rio Igrejas	120832.5	246100.9		
1165	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Macas	127220.5	201775.8		
1166	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Macas	130974.3	215585		
1167	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Maças	129502.4	220386.6		
1168	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Maças.	129541	220673.8		
1169	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Maças	130008.9	221181.8		
1170	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Maças	130120.6	221873.3		
1171	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Maças	130479.7	222824.1		
1172	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river- Rio Maças	130204.5	223793.6		
1173	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Maças	131268	225595.3		
1174	Sabor	2	2		1	Yes			2	1	3	3		Affluent river- Rio Maças	131371.6	226606		
1175	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Maças	131894.4	227013.4		
1176	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Maças	131441.4	229631.4		
1177	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Maças	131165	230871		
1178	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river- Rio Maças	130212.3	231869.4		
1179	Sabor	2	2		2	Yes			2	1	3	3		Affluent river- Rio Maças.	130702.3	232617.8		
1180	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river- Rio Maças.	131202.2	233824.5		
1181	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river- Rio Maças	131319.9	234552.4		




1182	Sabor	2	2		1	Yes			2	1	3	3		Affluent river- Rio Maças.	131863.9	235733.4		
1183	Sabor	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Maças	133971.9	245272		
1184	Sabor	2	2	Yes	1	Yes			2	1	3	3		Ribeira da Ponte de Pau	132066.5	197774.3		
1185	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Ribeira dos Gregos	134176.4	196007.8		
1398	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	138579	200969.8		
1399	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	129563.2	209103.8		
1400	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	128346.1	210264.7		
1401	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river.	131291.5	213160		
1402	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	131000.6	214739.4		
1403	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river.	130886.1	225093.2		
1406	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	128698.6	233356.7		
1407	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	128075	236871		
1408	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	126591.9	238105.6		
1410	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	133633.2	201740.8		
1411	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	133541	202245.2		
1412	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	133869.5	203329.4		
1413	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river	134197.8	203870.4		
1416	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	145226.7	219265.8		
1421	Sabor	2	2	Yes	2	Yes			2	1	3	3			137373.5	213895.9		
1422	Sabor	2	2		2	Yes			2	1	3	3			137429.2	214210.8		
1423	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river- Rio Agueira	137225.4	214987.6		
1424	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river- Rio Agueira	137183.8	215268.4		
1430	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river	139719.3	219147.1		
1431	Sabor	2	2	Yes	2	Yes			2	1	3	3		Affluent river	139266.7	219859.6		
1432	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- rio Onor	119610.7	240587.9		
1461	Sabor	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Onor	125420.3	253698.9		
1420	Sabor	2	2	Yes	2	Yes			2	1	3	3		Rio Agueira	137477.6	213608.9		
1496	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	138710.5	200941.4		
1497	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Igrejas	120011.5	243441		

1396- Castanheira dam *	Sabor	2	1		2	Yes			2	1	3	3	1	Affluent river- Barragem de Castanheira	109240	236019.4		
1397	Sabor	2	1	Yes	2	Yes			2	1	3	3		Affluent river	113431.8	228952.7		
1390	Sabor	1	2	Yes	1	Yes			2	1	3	3			120585.9	197996.7		
1392	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	123592.7	208020		
1393	Sabor	2	2	Yes	1	Yes			2	1	3	3		Affluent river	121978.4	213432.2		
1394	Sabor	1	2	Yes	2	Yes			2	4	3	3			115066.3	242270.3		
1395	Sabor	1	2	Yes	1	Yes			2	1	3	3			115340.2	243910.4		
1614															0	0		

## Baixo Sabor dam


Table 42: Baixo Sabor dam characteristics.

Infraestrutture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (hm <sup>3</sup> )	Useful capacity (hm <sup>3</sup> )
	123	3447	Concrete	Energy	236	505	-	1 095	630

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Valtorno dam


Table 43: Gimonde mini hydro charecteristics

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (hm <sup>3</sup> )	Useful capacity (hm <sup>3</sup> )
	32	14.49	Landfill	Water supply and irrigation	469,70	150	6	1,12	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Gimonde mini-hydro


Table 44: Gimonde mini hydro charecteristics

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	4	-	Cement	Energy	-	82	-	-	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Serra Serrada dam


Table 45: Serra serrada dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	25	9	Concrete	Water supply, Energy and sailing	1254	170	2	1680 x 1000	1500 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Ribeiro Grande e arco dam


Table 46: Ribeiro Grande dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	36	67	Landfill	Irrigation	189.5	614.5	8	5 387 000	4 222 000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Burga dam


Table 47: Burga dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	35	16	Landfill	Irrigation	331.5	353	8	1539 x 1000	1383 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Salgueiral dam


Table 48: Salgueiral dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	10	-	Landfill	irrigation	-	100	-	-	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Estevinha dam


Table 49: Estevinha dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	10	-	Landfill	irrigation	-	-	-	-	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Santa Justa dam

Table 50: Santa Justa dam charecteristics.


Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	39.3	34.4	Landfill	Irrigation	262	284	8	3476 x 1000	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)



## Azibo dam


Table 51: Azibo dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	56	91	Landfill	Water supply, irrigation, Landscape enhancement	606	551	10	54470 x 1000	46670 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Salgueiro dam


Table 52: Salgueiro dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	28	3.85	Landfill	irrigation	223.5	221	8	1800 x 1000	1650 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Camba dam


Table 53: Camba dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	35	6	Landfill	Water supply, irrigation	623	175	8	1110 x 1000	1080 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Gostei dam


Table 54: Camba dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	35	4.5	Landfill	Irrigation	759,65	238	8	1384 x 1000	1374 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Sambade dam

Table 55: Sambade dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	29	-	Landfill	Water supply	734	327	8	-	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.

Table 56: Picture of the obstacle seen in field in Sabor sub-basin

Obstacles seen in field			
146	147	155	159
			
160	177	307	322



**326**



**547**



**1144**



**1146**



**1151**



**1156**



**1167**



**1174**



**1177**



**1179**



**1385**



**1391**





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**1394**



**1410**



**1415**



**1420**



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**1430**



The Sousa tributary (**Figure 18**) presents 81 obstacles. Of these, two are mini hydro infrastructures. **Table 55** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

In **table 55**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 56**.

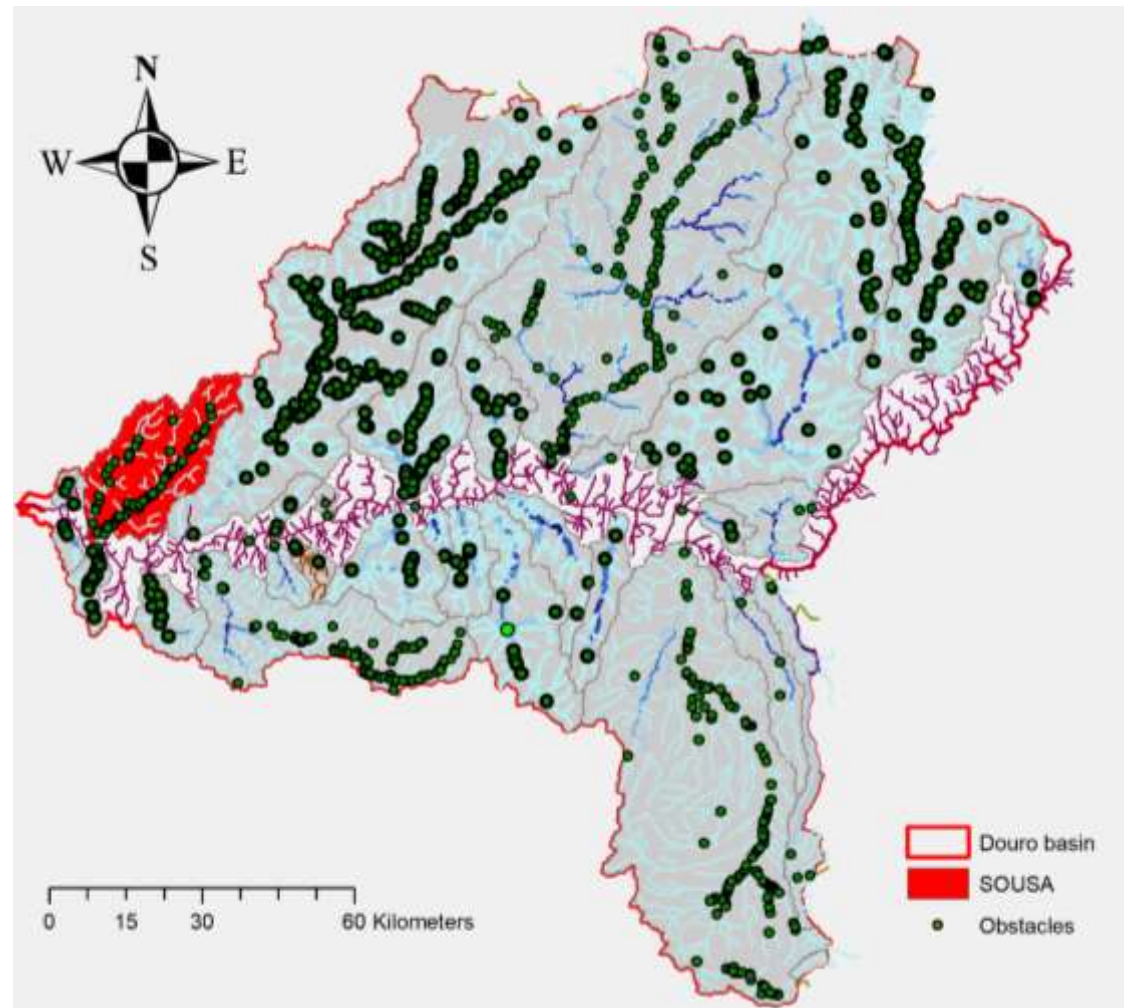


Figure 18: Highlight the Sousa river.



Table 57: Obstacles characteristics in Sousa sub-basin

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
496	Sousa	1	2		1	Yes			2	1	3	3			-27375.9	160435.5		
497	Sousa	1	2		2	Yes			2	1	3	3			-27290.3	160640.7		
498	Sousa	1	2		1	Yes			2	1	3	3			-26702.9	160250.1		
495	Sousa	1	2		2	Yes			2	1	3	3			-28479.5	159536.7		
499	Sousa	1	2		2	Yes			2	1	3	3			-25952.4	161302.5		
501	Sousa	1	2		1	Yes			2	1	3	3			-22963.3	164314.6		
502	Sousa	1	2		1	Yes			2	1	3	3			-21574.4	163750.8		
503	Sousa	1	2		1	Yes			2	1	3	3			-21306.1	164336.7		
505	Sousa	1	2		1	Yes			2	4	3	3			-19937.3	165591.7		
515	Sousa	1	2	Yes	1	Yes			2	4	3	3			-7371.41	183723.7		
507	Sousa	1	2		1	Yes			2	4	3	3			-18942.8	166663.9		
508	Sousa	1	2		1	Yes			2	4	3	3			-18295.7	166851.5		
535	Sousa	1	2		1	Yes			2	1	3	3			-16144.7	169942.6		
509	Sousa	1	2		1	Yes			2	1	3	3			-16356.2	169743.4		
510	Sousa	1	2		1	Yes			2	4	3	3			-15729	170611.7		
511	Sousa	1	2		1	Yes			2	4	3	3			-15666.4	170735.7		
513	Sousa	1	2	Yes	1	Yes	Yes		2	4	3	3			-13887.6	171953.2		
536	Sousa	1	2	Yes	1	Yes			2	1	3	3			-16002.4	170052.3		
512	Sousa	1	2		1	Yes			2	1	3	3			-8364.69	179780		
514	Sousa	1	2	Yes	1	Yes			2	1	3	3			-7238.59	182012.6		
525	Sousa	2	2		1	Yes			2	3	3	3		Affluent river-Rio Ferreira.	-21643.1	177030.2		
516	Sousa	2	2		2	Yes			2	4	3	3		Affluent river-Rio Ferreira.	-29954.6	163898.5		
530	Sousa	2	2		1	Yes			2	1	3	3		Affluent river-Rio Ferreira.	-29287.7	165134.4		
517	Sousa	2	2		1	Yes			2	4	3	3		Affluent river-Rio Ferreira	-27354.3	168857.6		
518	Sousa	1	2		1	Yes			2	4	3	3		Affluent river - Rio Ferreira.	-28040.8	170497.7		
519	Sousa	2	2		1	Yes			2	4	3	3		Affluent river-Rio Ferreira	-27383.3	171639.4		
526	Sousa	2	2		2	Yes			2	4	3	3		Affluent river - Rio Ferreira	-21725.6	177418.2		
528	Sousa	2	2		2	Yes			2	4	3	3		Affluent river-Rio Ferreira.	-30584	160900.2		

529	Sousa	2	2		1	Yes			2	1	3	3		Affluent river - Rio Ferreira.	-30095.5	163382.6		
531	Sousa	2	2	Yes	1	Yes			2	1	3	3		Affluent river - Rio Ferreira.	-29331.1	166192.9		
532	Sousa	1	2	Yes	2	Yes			2	4	3	3			-23938	162705.6		
533	Sousa	1	2	Yes	1	Yes			2	4	3	3			-23725.4	164438.3		
537	Sousa	1	2	Yes	1	Yes			2	4	3	3			-15823.4	170391.1		
504	Sousa	1	2	Yes	1	Yes			2	4	3	3			-20277.5	165593.2		
506	Sousa	1	2		1	Yes	1		2	4	3	3			-19231.9	166236.8		
534	Sousa	1	2	Yes	1	Yes			2	4	3	3			-18959.2	166559.6		
520	Sousa	2	2		1	Yes			2	4	3	3		Affluent river - Rio Ferreira.	-26225.4	172961.9		
521	Sousa	2	2		1	Yes			2	4	3	3		Affluent river - Rio Ferreira.	-23174	174391.4		
523	Sousa	2	2	Yes	1	Yes			2	1	3	3		Affluent river - Rio Ferreira.	-22193.3	175981.1		
524	Sousa	2	2	Yes	1	Yes			2	1	3	3		Affluent river - Rio Ferreira.	-22141.8	176025		
500- Mini- hydro Senhora do Salto	Sousa	1	1		2	Yes			2	4	3	3	5		-25121.9	162088.2	S	2
527- Mini- hydro Penhas- Altas	Sousa	2	1		2	Yes			2	4	3	3	5	Affluent river - Rio Ferreira.	-23521.1	173570.5		2
1195	Sousa	1	2		1	Yes			2	1	3	3			-29658.9	158976.6		
1196	Sousa	1	2		1	Yes			2	4	3	3			-28232.4	158724.1		
1197	Sousa	1	2	Yes	1	Yes			2	1	3	3			-27977.1	159911.4		
1198	Sousa	1	2	Yes	1	Yes			2	4	3	3			-25632.6	162105.3		
1199	Sousa	1	2		2	Yes			2	4	3	3			-25217.5	162236.6		
1200	Sousa	1	2	Yes	1	Yes			2	1	3	3			-27645.9	159924.7		
1201	Sousa	1	2	Yes	2	Yes			2	4	3	3			-25749.7	161785.6		
1202	Sousa	1	2	Yes	1	Yes			2	4	3	3			-25696.6	161972.3		
1203	Sousa	1	2		1	Yes			2	4	3	3			-24436.6	162200		
1204	Sousa	1	2	Yes	2	Yes			2	4	3	3			-23598.7	164755.6		
1205	Sousa	1	2	Yes	1	Yes			2	1	3	3			-22470.9	164430.2		
1206	Sousa	1	2		1	Yes			2	1	3	3			-21345.3	164615.5		

1207	Sousa	1	2	Yes	2	Yes			2	4	3	3			-20545	165404.7		
1208	Sousa	1	2	Yes	1	Yes			2	4	3	3			-20529.4	165424.7		
1209	Sousa	1	2	Yes	1	Yes			2	4	3	3			-18770.1	166743.8		
1210	Sousa	1	2	Yes	1	Yes			2	4	3	3			-17194.8	168067.2		
1211	Sousa	1	2	Yes	1	Yes			2	4	3	3			-15532.7	170897.3		
1212	Sousa	1	2		1	Yes			2	4	3	3			-15551.7	171066.3		
1213	Sousa	1	2		1	Yes			2	4	3	3			-15519	171158		
1214	Sousa	1	2	Yes	1	Yes			2	4	3	3			-15135.1	171264.2		
1215	Sousa	1	2		1	Yes	Yes		2	4	3	3			-13149.6	172777.1		
1216	Sousa	1	2	Yes	1	Yes			2	4	3	3			-12957.4	173028.1		
1217	Sousa	1	2	Yes	1	Yes	Yes		2	4	3	3			-11718.2	175048.4		
1218	Sousa	1	2		1	Yes			2	4	3	3			-11292.3	175390.9		
1219	Sousa	1	2		1	Yes			2	4	3	3			-10826.4	175786		
1220	Sousa	1	2		1	Yes			2	4	3	3			-10275.9	177694.6		
1221	Sousa	1	2		1	Yes			2	4	3	3			-10209.7	177756.1		
1222	Sousa	1	2		1	Yes			2	4	3	3			-10147.9	177812.7		
1223	Sousa	1	2		1	Yes			2	4	3	3			-8802.77	178565.3		
1224	Sousa	1	2	Yes	1	Yes			2	4	3	3			-8671.37	178892.5		
1369	Sousa	2	2	Yes	1	Yes			2	4	3	3		Rio Ferreira	-23541.7	173726.8		
1370	Sousa	2	2	Yes	1	Yes			2	4	3	3			-23410.6	174300.4		
1462	Sousa	1	2	Yes	1	Yes			2	4	3	3			-20661.1	165262.4		
1463	Sousa	1	2	Yes	2	Yes			2	4	3	3			-16478.9	169620.2		
1464	Sousa	2	2	Yes	2	Yes			2	4	3	3		Affluent river- Rio Mezio	-14902	171635.9		
1465	Sousa	2	2	Yes	2	Yes	Yes		2	4	3	3		Affluent river - Rio Mezio	-15379.1	175048.1		
1466	Sousa	2	2	Yes	1	Yes			2	4	3	3		Affluent river	-14799.1	181041.7		
1609	Sousa	2		Yes		Yes				4	3	3			0	0	2	
1610	Sousa	2		Yes		Yes				4	3	3			0	0	2	

Table 58: Pictures of the obstacles seen in field in Sousa sub-basin.

Obstacles seen in field			
500	506	512	520



524



529



537



1197



1199



1200



1205



1214



1217



1609



1610





The Tâmega tributary (**Figure 19**) presents 286 obstacles. Of these, 14 are mini hydro and 7 are large infrastructures. **Table 57** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

**Table 58** to **65** shows the specific characteristics of the large dams.

In **table 57**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 66**.

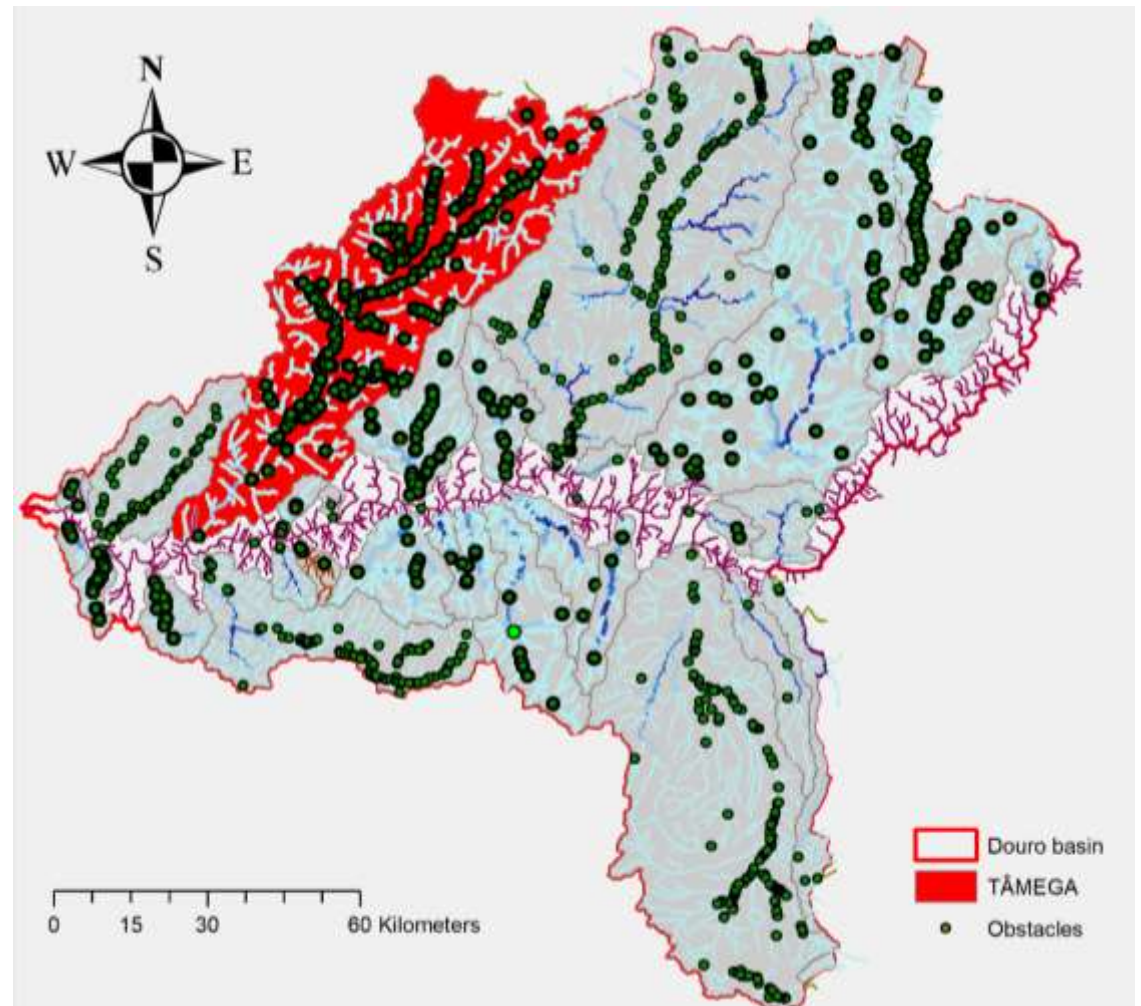


Figure 19: Highlight the Tâmega river.

Table 59: Obstacles characteristics in Tâmega sub-basin

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
1553	Tamega	2	2	Yes	2	Yes			2	4	3	3		Affluent river-Rio Peio	9686.35	208188.7		
1434	Tamega	2	2	Yes	2	Yes			2	1	3	3		Affluent river-Rio Torno	31437.07	203384.8		
1435	Tamega	2	2	Yes	2	Yes			2	1	3	3		Affluent river-Rio Torno	36259.59	201252.3		
1554	Tamega	2	2		2	Yes			2	4	3	3		Affluent river-Rio Peio	9519.754	208227.2		
1555	Tamega	2	2		2	Yes			2	4	3	3		Affluent river - Rio Peio	9336.794	208322		
1338	Tamega	2	2	Yes	1	Yes			2	1	3	3		Ribeiro de Gondiaes	25537.09	213896.1		
383	Tamega	1	2		1	Yes			2	1	3	3			42308.41	218852.4		
382	Tamega	1	2		1	Yes			2	1	3	3			41784.79	218712.2		
390	Tamega	1	2		1	Yes			2	1	3	3			49632.08	225903.7		
389	Tamega	1	2	Yes	1	Yes			2	4	3	3			48146.82	224504.7		
392	Tamega	1	2		2	Yes			2	4	3	3			56117.27	231808.4		
394	Tamega	2	2	Yes	2	Yes			2	1	3	3			6681.422	175756.8		
384	Tamega	1	2		1	Yes			2	4	3	3			44220.08	221194.1		
385	Tamega	1	2		1	Yes			2	4	3	3			45376.91	221496.7		
387	Tamega	1	2		1	Yes			2	4	3	3			46294.07	221864.5		
388	Tamega	1	2		1	Yes			2	4	3	3			46766.38	222767.9		
1295	Tamega	2	2	Yes	2	Yes			2	4	3	3		Affluent river.	14113.86	202346		
402	Tamega	2	2	Yes	1	Yes			2	1	3	3			13323.02	203391.7		
403	Tamega	2	2	Yes	1	Yes			2	1	3	3			13292.16	203510.4		
404	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river.	13631.02	203800		
405	Tamega	2	2	Yes	1	Yes			1	1	3	3		Affluent river-Rio Louredo..	21345.18	200250.7		
406	Tamega	2	2	Yes	1	Yes			2	1	3	3		Rio Louredo - Affluent river.	22254.29	200359.6		
407	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river-Rio Louredo.	22635.28	200382.9		
408	Tamega	2	2	Yes	2	Yes			2	1	3	3		Affluent river-Rio Louredo.	22853.11	200657.4		
415	Tamega	2	1		2	Yes			2	1	3	3		Affluent river-Rio Beça.	26714.82	211196.2	S	2



396 - Barragem da Fundeira	Tamega	2	1		2	Yes			2	1	3	3		Affluent river - Rio Olo. Barragem da Fundeira.	27977.24	187819.6		2
413	Tamega	2	1	Yes	2	Yes			2	1	3	3		Rio Torno	35173.52	201894.9		2
417 - Barragem do Canedo	Tamega	2	1		2	Yes			2	1	3	3		Barragem do Canedo. Rio Beça - Affluent river.	34518.42	220978.5	S	2
424	Tamega	2	1	Yes	2	Yes			2	1	3	3			49789.2	221325.1		1
409	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Louredo.	22883.8	201252.9		
411	Tamega	2	2	Yes	1	Yes			2	1	3	3		Rio Torno	33662.11	202763.1		
416	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Beça.	29700.57	213028.2		
423	Tamega	1	2		2	Yes	Yes		2	1	3	3			58505.42	237618.9		
400	Tamega	2	2		1	Yes			2	4	3	3		Rio Cabril- Affluent river.	15116.2	192114.5		
399	Tamega	2	2		2	Yes			2	4	3	3		Affluent river- Rio Cabril.	15461.13	192060		
401	Tamega	2	2		1	Yes			2	4	3	3		Affluent river- Rio Cabril	14699.4	192594.5		
410	Tamega	2	1	Yes	2	Yes			2	1	3	3		Rio Torno.	31663.36	203297.6		2
414 - Barragem da Falperra	Tamega	2	1		2	Yes			2	1	3	3		Barragem da Falperra. Rio Torno.	38846.43	204062.3		2
412	Tamega	2	1	Yes	2	Yes			2	1	3	3		Rio Torno	33968.97	202632.1		2
457	Tamega	1	2	Yes	1	Yes			2	1	3	3			27592.13	207216		
425	Tamega	1	2		1	Yes			2	1	3	3			26357.99	207008.7		
433	Tamega	1	2	Yes	2	Yes			2	4	3	3			4257.616	177621.1		
436	Tamega	1	2	Yes	1	Yes			2	1	3	3			12003.34	186384		
460	Tamega	1	2	Yes	1	Yes			2	1	3	3			52018.87	227267.7		
458	Tamega	1	2	Yes	1	Yes			2	1	3	3			27753.65	207746.5		
437	Tamega	1	2	Yes	1	Yes			2	1	3	3			12908.59	188885.2		
459	Tamega	1	2	Yes	1	Yes			2	4	3	3			35810.11	214194.4		
439	Tamega	1	2	Yes	1	Yes			2	1	3	3			14079.31	193126.2		
440	Tamega	1	2	Yes	1	Yes			2	1	3	3			13939.42	193595		
441	Tamega	1	2	Yes	1	Yes			2	1	3	3			14107.19	193948.4		
442	Tamega	1	2	Yes	1	Yes			2	1	3	3			14591.64	194399.7		
443	Tamega	1	2	Yes	1	Yes			2	1	3	3			15383.33	195115.7		

444	Tamega	1	2	Yes	1	Yes			2	1	3	3			15772.22	195501.5		
445	Tamega	1	2	Yes	1	Yes			2	1	3	3			16272.04	197130.7		
446	Tamega	1	2	Yes	1	Yes			2	1	3	3			16335.74	197433.4		
447	Tamega	1	2	Yes	1	Yes			2	1	3	3			15875.1	198044.4		
448	Tamega	1	2	Yes	1	Yes			2	1	3	3			16267.21	199423.4		
449	Tamega	1	2	Yes	1	Yes			2	1	3	3			16250.8	200868.4		
450	Tamega	1	2	Yes	1	Yes			2	1	3	3			19266.04	202315.2		
451	Tamega	1	2	Yes	1	Yes			2	1	3	3			20355.7	205193.7		
452	Tamega	1	2	Yes	1	Yes			2	1	3	3			20824.08	205791.9		
453	Tamega	1	2	Yes	1	Yes			2	1	3	3			21480.84	205879.9		
454	Tamega	1	2	Yes	1	Yes			2	1	3	3			22194.99	205953.7		
455	Tamega	1	2	Yes	1	Yes			2	1	3	3			24514.09	206455.2		
456	Tamega	1	2	Yes	1	Yes			2	1	3	3			25098.09	206563.9		
461	Tamega	1	2	Yes	1	Yes			2	4	3	3			52861.92	227924.6		
435	Tamega	1	2	Yes	1	Yes			2	1	3	3			11246.45	185931.2		
438	Tamega	1	2	Yes	1	Yes			2	4	3	3			13171.65	189477.8		
434	Tamega	1	2	Yes	1	Yes			2	4	3	3			6429.791	180001		
1564	Tamega	2	2	Yes	1	Yes	Yes		2	1	3	3		Affluent river- Ribeira do Couto	27697.86	218332.4		
1569	Tamega	2	2	Yes	2	Yes			2	1	3	3		Affluent river- Rio Torno	38455.93	203361.7		
1565	Tamega	2	2		1	Yes			2	4	3	3		Affluent river- Ribeira do Rio Douro	13321.94	207633.5		
1566	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river - Ribeira do Rio Douro	13350.53	207776.1		
1567	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Ribeira do Rio Douro	13526.07	207952.9		
1568	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Ribeira do Rio Douro	13629.61	208205.7		
578	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Ouro	13460.55	203018.5		
579	Tamega	2	2	Yes	2	Yes			2	4	3	3		Affluent river- Rio Ouro	14172.23	202445.9		
1570	Tamega	2	2	Yes	2	Yes			2	4	3	3		Affluent river	12477.66	205257.3		
1571	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river-	12071.04	205701.7		

1572	Tamega	2	2		1	Yes			2	1	3	3		Affluent river	12137.62	206132		
1573	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river	11339.16	206407.5		
1574	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river	11170.46	206859.5		
1575	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river	10872.92	207327.3		
844	Tamega	1	2	Yes	1	Yes			2	1	3	3			19844.38	203332.3		
845	Tamega	1	2	Yes	1	Yes			2	1	3	3			19762.73	204600.2		
846	Tamega	1	2	Yes	1	Yes			2	1	3	3			22592.45	206296.9		
847	Tamega	1	2	Yes	1	Yes			2	1	3	3			23088.24	206466		
848	Tamega	1	2	Yes	1	Yes			2	1	3	3			25417.48	206625.5		
849	Tamega	1	2	Yes	1	Yes			2	1	3	3			27748.53	207691.9		
850	Tamega	1	2	Yes	1	Yes			2	1	3	3			27805.1	207566.2		
853	Tamega	1	2	Yes	1	Yes			2	1	3	3			31925.24	210565.5		
854	Tamega	1	2	Yes	1	Yes			2	1	3	3			32611.37	210628.4		
855	Tamega	1	2	Yes	1	Yes			2	1	3	3			33177.39	210685.2		
856	Tamega	1	2	Yes	1	Yes			2	1	3	3			34227.5	212268.2		
843	Tamega	1	2	Yes	1	Yes			2	1	3	3			16144.35	198936.4		
876	Tamega	1	2	Yes	2	Yes			2	1	3	3			50223.67	226102.5		
422 - Barragem de Mairos*	Tamega	2	1		2	Yes			2	1	3	3		Barragem de Mairos	67351.6	239595.7		2
381 - Barragem do Torrao*	Tamega	1	1		2	Yes			2	4	3	3	2	Grande hídrica do Torrão	-10762	158677.1		2
419 - Barragem da Curalha*	Tamega	2	1		2	Yes			2	1	3	3		Barragem da Curalha.	50852.27	229345		2
421 - Barragem do Arcosso*	Tamega	2	1		2	Yes			2	1	3	3		Barragem do Arcossó. Ribeira de Arcossó	62595.34	235079.9		2
430 - Mini hydro Cefra	Tamega	2	1		2	Yes			2	1	3	3	5	Mini hydroCefra. Rio de Ouro.	12781.95	204730.8		2
429 - Mini hydro Alvadia	Tamega	2	1		2				2	1	3	3	5	Mini hydrode Alvadia. Affluent river- Rio Poio.	29608.3	197380.4		2
851 - Mini hydrode Bragadas	Tamega	1	1	Yes	2				2	1	3	3	5	Mini hydrode Bragadas.	28973.93	208300.9		2

1286 – Rego de Milho *	Tamega	2	1		2	Yes			2	1	3	3		Barragem de Rego do Milho.	53739.46	241354.8		2
391 - Mini hydroCuralha-Chaves	Tamega	1	1	Yes	2	Yes			2	1	3	3	5	Mini hydroCuralha-Chaves	51358.61	227113.6		1
432 - Mini hydro de Agilde	Tamega	2	1	Yes	2	Yes			2	4	3	3	5	Mini hydrode Agilde. Affluent river-Ribeira Velha de Santa Natalia	2426.06	188262.7	S	1
1552	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river	11981.79	205350.1		
428 - Mini hydro Canedo	Tamega	2	1		2	Yes			2	1	3	3	5	Mini hydroCanedo II. Affluent river-Rio Beça.	32666.74	216352.2		2
386 - Mini hydro de Peneda	Tamega	1	1	Yes	2	Yes			2	4	3	3	5	Mini hydrode Peneda	46177.03	221576.8		2
393 - Mini hydro de Lomba	Tamega	2	1	Yes	2	Yes			2	1	3	3	5	Mini hydrode Lomba	6541.152	175452.5		1
395 - Mini hydrode Candemil	Tamega	2	1	Yes	2	Yes			2	1	3	3	5		14173.69	175364.8	S	2
398 - Mini hydro Pego-Negro	Tamega	2	1	Yes	2	Yes			2	1	3	3	5		3665.169	184889.8		1
418 - Mini hydro de Bragado	Tamega	2	1		2	Yes			2	1	3	3	5	Affluent river.	40020.12	211908		2
426 - Mini hydro Covas do Barroso	Tamega	1	1	Yes	2	Yes			2	1	3	3	5	Affluent river-Ribeira do Couto.	26742.71	219240		2
427 - Mini hydroCovas do Barroso	Tamega	1	1	Yes	2	Yes			2	4	3	3	5	Affluent river-Rio Covas.	28894.15	218969.3		2
431 - Mini hydro Casal (Ceiroal)	Tamega	2	1	Yes	2	Yes			2	4	3	3	5	Affluent river-Rio Peio.	9721.101	208515.7	S	2

1477	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	35018.01	223821.4		
1478	Tamega	2	2	Yes	2	Yes			2	1	3	3		Affluent river	26280.8	213173.2		
1479	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	24780.47	214145		
1480	Tamega	2	2	Yes	1	Yes			2	1	3	3			23820.03	214924.8		
1481	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	18156.29	205667.2		
1482	Tamega	2	2	Yes	1	Yes			2	1	3	3			18139.89	205736.8		
1483	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Terva	40052.9	223374.2		
1484	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Terva	40307.29	223342.4		
1485	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Terva	40690.81	223654		
825	Tamega	1	2	Yes	1	Yes			2	4	3	3			4971.5	178110		
826	Tamega	1	2	Yes	1	Yes			2	4	3	3			7200.344	180882		
828	Tamega	1	2	Yes	1	Yes			2	4	3	3			7038.831	181781.1		
830	Tamega	1	2	Yes	1	Yes			2	1	3	3			9241.313	184266.5		
831	Tamega	1	2	Yes	1	Yes			2	1	3	3			7411.324	182595.2		
832	Tamega	1	2	Yes	1	Yes			2	1	3	3			12446.05	187649		
833	Tamega	1	2	Yes	1	Yes			2	4	3	3			13484.29	191507.1		
834	Tamega	1	2	Yes	1	Yes			2	4	3	3			12744.36	191641.9		
835	Tamega	1	2	Yes	1	Yes			2	4	3	3			13210.66	192280.9		
836	Tamega	1	2	Yes	1	Yes			2	1	3	3			13277.38	192612		
837	Tamega	1	2	Yes	1	Yes			2	1	3	3			13622.81	192493.8		
838	Tamega	1	2	Yes	1	Yes			2	1	3	3			14075.56	192438.7		
839	Tamega	1	2	Yes	1	Yes			2	1	3	3			14771.34	194547.6		
840	Tamega	1	2	Yes	1	Yes			2	1	3	3			16230.68	196548.2		
841	Tamega	1	2	Yes	1	Yes			2	1	3	3			16354.32	197386.1		
842	Tamega	1	2	Yes	1	Yes			2	1	3	3			15823.5	198250.2		
857	Tamega	1	2	Yes	1	Yes			2	1	3	3			34830.47	212386.3		
858	Tamega	1	2	Yes	1	Yes			2	1	3	3			36169.09	212651.9		
859	Tamega	1	2	Yes	1	Yes			2	4	3	3			35653.38	214043.9		
860	Tamega	1	2	Yes	1	Yes			2	1	3	3			37051.31	214690.1		
861	Tamega	1	2	Yes	1	Yes			2	1	3	3			38505.79	215631.7		
862	Tamega	1	2	Yes	1	Yes			2	1	3	3			38496.1	215789.9		
883	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river. Rio Olo.	9848.186	181857.5		
884	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Olo.	10003.53	181817.1		

885	Tamega	2	2	Yes	2	Yes			2	4	4	4		Affluent river- Rio Olo.	10688.74	181957.9		
886	Tamega	2	2	Yes	1	Yes			2	1	3	3			11851.19	182893.3		
887	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river. Rio Olo.	12297.6	183292		
888	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river. Rio Olo.	12228.3	183568.6		
890	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	12965.05	184186.3		
895	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	15980.6	187256.4		
896	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Olo.	17225.13	188397.1		
897	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Olo.	17570.78	187931.3		
898	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	17614.11	186492.3		
899	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	17628.85	186365.1		
901	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Olo.	18108.81	186549.8		
904	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Olo.	19128.9	187067.3		
905	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Olo.	19291.51	187038.5		
906	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river - Rio Olo.	19640.46	187303.5		
907	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river - Rio Olo.	20877.75	188816.7		
908	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Olo.	23245.15	189989.1		
909	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Olo.	23781.65	190019.7		
911	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	24144.83	190392		
913	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	24556.65	190559.3		
914	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo	24466.5	190473.8		



917	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	26477.94	190023.5		
918	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	26713.58	189905.5		
919	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	26818.79	189849.5		
920	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	27089.74	189764.6		
921	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	27279.34	189482.5		
922	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	27809.47	188866.4		
923	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Olo.	28163.27	188729.9		
924	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Olo.	28292.47	188692.4		
925	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	28672.1	188743.3		
926	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	28861.98	188876.2		
927	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	30054.17	189688.4		
928	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river. Rio Cabril.	14818.98	192386.1		
929	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Cabril	14907.88	192248.2		
930	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Cabril.	18513.18	192126.1		
931	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river - Rio Cabril.	18679.29	192067.2		
932	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river- Rio Cabril.	18873.51	191898.5		
933	Tamega	2	2	Yes	1	Yes			2	4	3	3		Rio Cabrao - Afluente do Rio Cabril	21208.34	190485.9		
934	Tamega	2	2	Yes	1	Yes			2	4	3	3		Rio Cabrao - afluente do Rio Cabril	21492.04	190686.7		


935	Tamega	2	2	Yes	1	Yes			2	4	3	3		Rio Cabrao- Afluente do Rio Cabril.	24295.89	191968.2		
1285	Tamega	1	2	Yes	1	Yes			2	1	3	3			31255.32	209101.8		
1288	Tamega	2	2		1	Yes			2	1	3	3		Affluent river	25893.24	218806.4		
1289	Tamega	2	2		1	Yes			2	1	3	3		Affluent river	25605.5	218774.6		
1290	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river.	24889.22	218921.4		
1291	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river	15546.99	201807.2		
1292	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river.	14793.83	201909.5		
1293	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river.	14673.11	202487.2		
1294	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river.	14630.29	202541.3		
1304	Tamega	2	2	Yes	1	Yes			2	4	3	3			3027.313	185869.2		
1305	Tamega	2	2	Yes	1	Yes			2	4	3	3			2983.916	185889.8		
1306	Tamega	2	2	Yes	1	Yes			2	4	3	3			2935.235	185980.6		
1307	Tamega	2	2	Yes	1	Yes			2	1	3	3			27992.86	217399.8		
1308	Tamega	2	2	Yes	1	Yes			2	1	3	3			27925.59	217221.8		
1310	Tamega	1	2	Yes	1	Yes			2	1	3	3			28400.44	216597.5		
1311	Tamega	2	2	Yes	1	Yes	Yes		2	1	3	3			28805.06	216507		
1312	Tamega	2	2	Yes	1	Yes			2	1	3	3			28945.35	216490.9		
1313	Tamega	2	2	Yes	1	Yes			2	1	3	3			28654.46	215955.2		
1314	Tamega	2	2	Yes	1	Yes			2	1	3	3			27909.12	213126.7		
1315	Tamega	2	2	Yes	1	Yes			2	1	3	3			28451.85	212845.9		
1316	Tamega	2	2	Yes	1	Yes			2	1	3	3			28924.18	212728.5		
1317	Tamega	2	2	Yes	1	Yes			2	1	3	3			31306.57	214488.7		
1318	Tamega	2	2	Yes	1	Yes			2	1	3	3			31623.96	215085.5		
1319	Tamega	2	2	Yes	1	Yes			2	1	3	3			32345.59	215680.8		
1320	Tamega	2	2	Yes	1	Yes			2	1	3	3			32592.67	216133.1		
1321	Tamega	2	2	Yes	1	Yes			2	4	3	3			32747.32	217227.1		
1322	Tamega	2	2	Yes	1	Yes			2	1	3	3			32804.12	217348.9		
1323	Tamega	2	2		1	Yes			2	4	3	3		Rio Beça	34674.09	222922.2		
1324	Tamega	2	2		1	Yes			2	1	3	3		Rio Beça	34713.35	224287.6		
1325	Tamega	2	2	Yes	1	Yes			2	1	3	3		Rio Beça	34979.09	224598.5		
1326	Tamega	2	2		1	Yes			2	1	3	3		Rio Beça	34753.2	225863.3		
1327	Tamega	2	2	Yes	1	Yes			2	1	3	3		Rio Beça	34968.99	225955.8		
1328	Tamega	2	2	Yes	1	Yes			2	1	3	3		Rio Beça	35055.82	226299.5		
1329	Tamega	2	2		1	Yes			2	1	3	3		Rio Beça	35127.03	226433.1		
1330	Tamega	2	2	Yes	1	Yes			2	1	3	3		Rio Beça	35043.4	226797.5		
1331	Tamega	2	2	Yes	1	Yes			2	1	3	3		Rio Beça	35298.33	227293.9		
1332	Tamega	2	2		1	Yes			2	1	3	3		Affluent river	35662.43	228137.7		

1333	Tamega	2	2	Yes	1	Yes			2	1	3	3		Rio Beça	35775.06	228536.7		
1334	Tamega	2	2		1	Yes			2	1	3	3		Rio Beça	35742.33	229286.8		
1335	Tamega	2	2	Yes	1	Yes			2	1	3	3		Rio Beça	35937.16	229900.2		
1336	Tamega	2	2	Yes	1	Yes			2	1	3	3		Ribeiro de Gondiaes	25632.97	213824.8		
1339	Tamega	2	2	Yes	1	Yes			2	1	3	3		Ribeiro de Gondiaes	25288.98	214057.6		
1340	Tamega	2	2	Yes	1	Yes			2	1	3	3		Ribeiro de Gondiaes	24482.18	214374.4		
1341	Tamega	2	2	Yes	1	Yes			2	1	3	3		Ribeiro de Gondiaes	24437.08	214377		
1342	Tamega	2	2	Yes	1	Yes			2	1	3	3		Ribeiro de Gondiaes	24407.48	214479.4		
1343	Tamega	2	2	Yes	1	Yes			2	1	3	3		Ribeiro de Gondiaes	24001.09	214813.4		
1344	Tamega	2	2	Yes	1	Yes			2	4	3	3			-286.883	169778.1		
1345	Tamega	2	2	Yes	1	Yes			2	1	3	3			2880.569	171530.7		
1346	Tamega	2	2	Yes	1	Yes	Yes		2	4	3	3		Rio Beça	33097.47	218655.9		
1347	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	22055.68	200655.2		
1348	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	32711.95	202874.5		
1350	Tamega	2	2	Yes	1	Yes	Yes		2	1	3	3		Affluent river	32283.9	203015.4		
1351	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	32984.82	202994		
1352	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	25286.61	199541.2		
1353	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river	24485.54	199893.3		
1354	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river	24086.29	200091.1		
1355	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	18056.14	206139.5		
1356	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	17955.65	206715.3		
1357	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	17897.93	207840.4		
1358	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	39643.44	222736.2		
1359	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	39602.74	222792.3		
1360	Tamega	2	2	Yes	1	Yes	Yes		2	1	3	3		Affluent river	41185.39	224031.5		
1361	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	41414.8	224393.3		
1362	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	41693.49	224470.6		
1363	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river.	42314.21	224705.4		
1364	Tamega	2	2	Yes	1	Yes			2	1	3	3			42547.48	225127.1		
1365	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	42798.09	225956.2		
1366	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river.	42866.52	226422.4		
1367	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	43597.14	227574.4		
1368	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river.	43945.28	233275.7		

1456	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo.	27327.68	189238		
1457	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Olo	29276.78	188910.9		
1471	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river	13858.34	202369.8		
1472	Tamega	2	2	Yes	1	Yes			2	4	3	3		Affluent river	13528.84	202906.2		
1476	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	32772.1	217191.2		
1486	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	43788.92	228211.5		
1487	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	44001.54	228427.6		
1488	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	43991.79	229918.2		
1489	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	44234.33	231188.6		
1490	Tamega	2	2	Yes	1	Yes			2	1	3	3		Affluent river	44075.71	232607.8		
1287	Tamega	2	2	Yes	1	Yes			2	1	3	3			26037.47	219104.3		
1337	Tamega	2	2	Yes	1	Yes			2	1	3	3		Ribeiro de Gondiaes	25620.75	213869.4		
1627															0	0		

## Canedo dam


Table 60: Canedo dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	15	-	Concrete	Energy	243	-	-	-	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Mairos dam


Table 61: Mairos dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	23.5	2.21	Landfill	irrigation	801.5	213.5	-	369 x 1000	359,7 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Rego de Milho dam


Table 62: Mairos dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	-	2.1	Landfill	irrigation	457	349	-	1880 x 1000	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Torrão dam


Table 63: Torrão dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	70	3252.1	Concrete	Energy	69	218	8.35	124000 x 1000	77000 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Curralha dam

Table 64: Torrão dam charecteristics.


Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	16	5	Landfill	Irrigation	406.5	210	-	792 x 1000	740 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)



## Arcossó dam





Table 65: Arcosso dam charecteristics.

Infraestrutture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	40	31.1	Landfill	Water supply	540	315	8	4876 x 1000	-

Source: [http://cnpgeb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpgeb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.

Table 66: Picture of the obstacle seen in field in Tâmega sub-basin

Obstacles seen in field			
386	387	388	389
			
390	391	415	417



423



428



461



876



1314



1326



1346



1358



1359



1361



1367



1485





The Távora tributary (**Figure 20**) presents 9 obstacles. Of these, two are mini hydro and another two are large dam. **Table 64** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

**Table 65 and 66** shows the specific characteristics of the large dams.

In **table 64**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 67**.

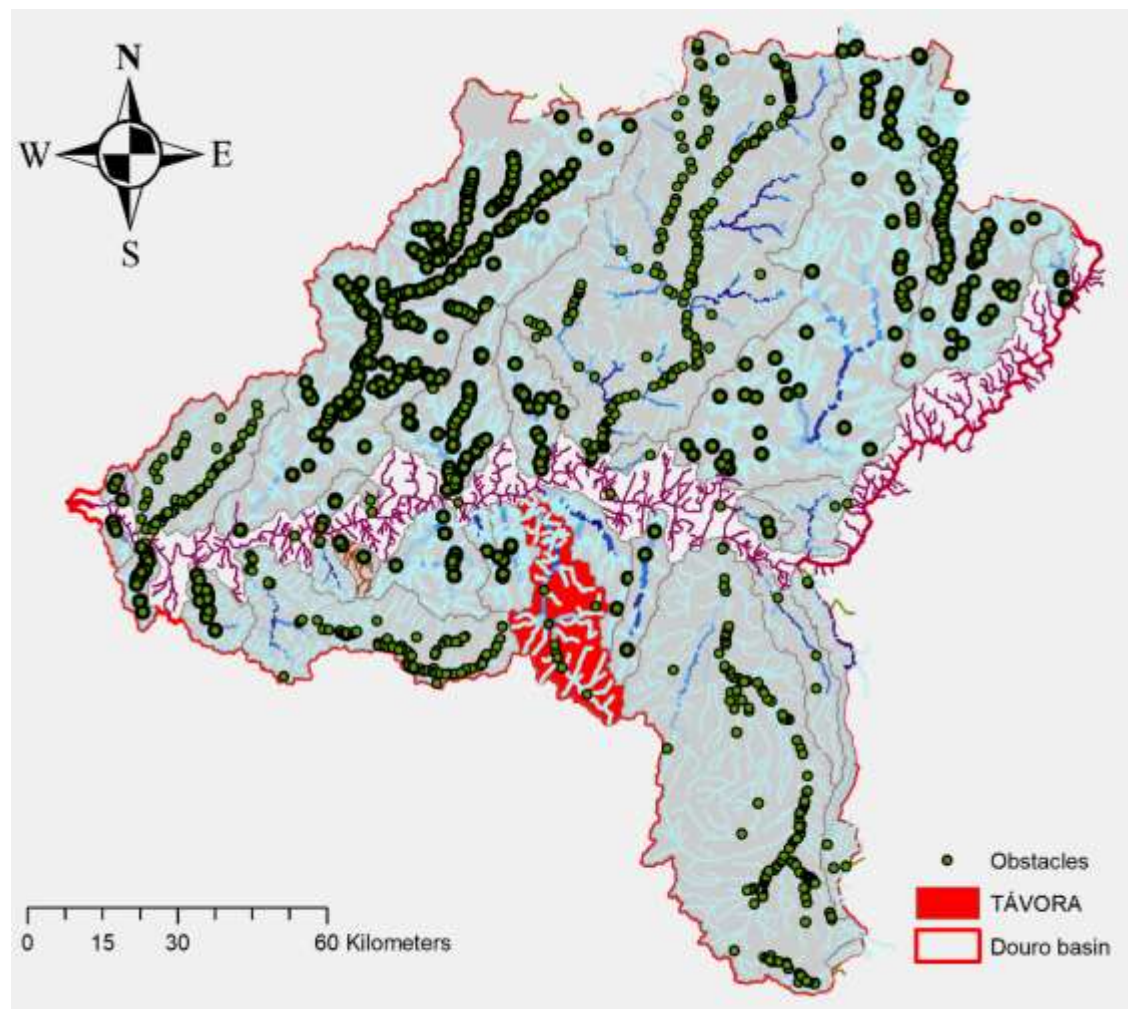



Figure 20: Highlight the Távora river

Table 67: Obstacles characteristics in Távora sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
559	Távora	1	2		1	Yes			2	1	3	3			58903.86	125770.9		
560 – Dama dam*	Távora	2	1		2	Yes			2	1	3	3		Ribeira de Ferreirim	60643.37	143341.5		2
556 - Villar-dam*	Távora	1	1		2	Yes			2	1	3	3		big-hydro Vilar-Tabuaco.	50275.02	146568		2
557 - Mini hydro Ponte Nova	Távora	1	1	Yes	2	Yes			2	1	3	3	5	Mini hydroPonte Nova.	52282.84	135729.7	S	2
558 - Mini hydro Barreiros	Távora	1	1	Yes	2	Yes			2	1	3	3	5	Barreiros	52946.87	133038.1		2
1247	Távora	1	2	Yes	1	Yes			2	1	3	3			52652.64	134010.3		
1248	Távora	1	2	Yes	2	Yes			2	4	3	3			53802.94	131181.9		
1613	Távora	1	1	yes	2	yes	1	1	2	3	4	4	5		0	0	2	2
1627															0	0		

## Dama dam


Table 68: Dama dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	11.3	-	concrete	-	-	-	-	-	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Vilar dam

Table 69: Vilar dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	58	360	Landfill	Energy	555	240	5.2	99750 x 1000	95270 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.

Table 70: Picture of the obstacle seen in field in Tavora sub-basin

Obstacles seen in field		
560	558	1613
		



The Tedo tributary (**Figure 21**) presents 7 obstacles. Of these, all are weirs except the Granja do Tedo Mini Hydro. **Table 68** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

In **table 68**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 69**.

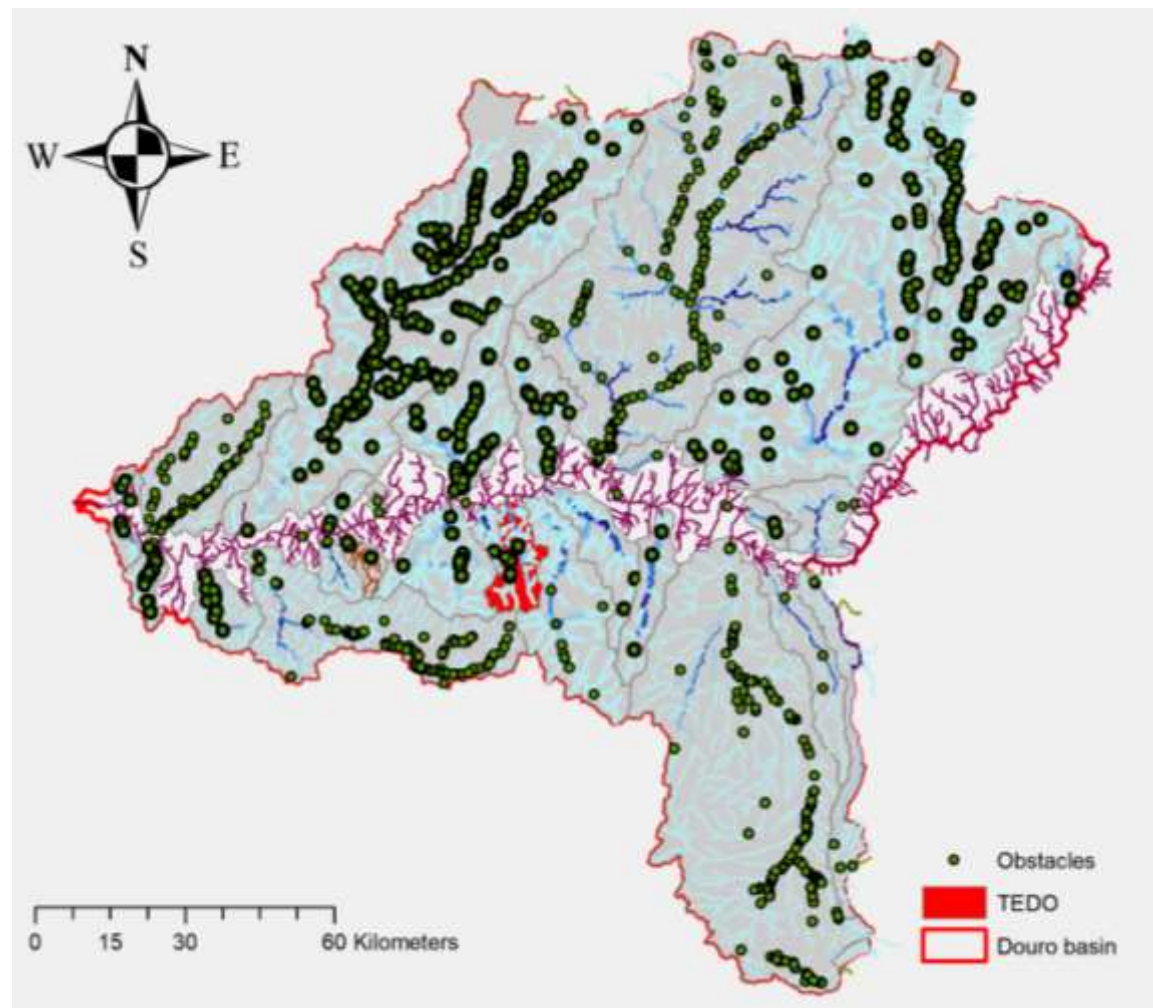


Figure 21: Highlight the Tedo river

Table 71: Obstacles characteristics in Tedo sub-basin

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
1250	Ribeira do Tedo	2	1		2	Yes			2	4	3	3		Affluent river - Ribeira de Leomil	42027.5	152713.2		2
561 - Mini hydro Granja do Tedo	Ribeira do Tedo	2	1		2	Yes			2	1	3	3	5	Ribeira de Leomil	43567.93	155135.4		2
1249	Ribeira do Tedo	1	2	Yes	1	Yes			2	4	3	3			43548.55	155449.8		
1251	Ribeira do Tedo	2	2	Yes	1	Yes			2	4	3	3		Affluent river.	41062.06	153308.9		
1252	Ribeira do Tedo	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Ribeira de Leomil	41856.97	149422.5		
1253	Ribeira do Tedo	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Ribeira de Leomil.	41956.28	149871.8		
1467	Ribeira do Tedo	1	2	Yes	2	Yes			2	4	3	3			43634.5	155597.3		

Table 72: Picture of the obstacle seen in field in Tedo sub-basin.



The Teja tributary (**Figure 22**) presents three obstacles. Of these, one is a large dam and another one is a mini hydro. **Table 70** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

**Table 71** shows the specific characteristics of the large dam.

In **table 70**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 72**.

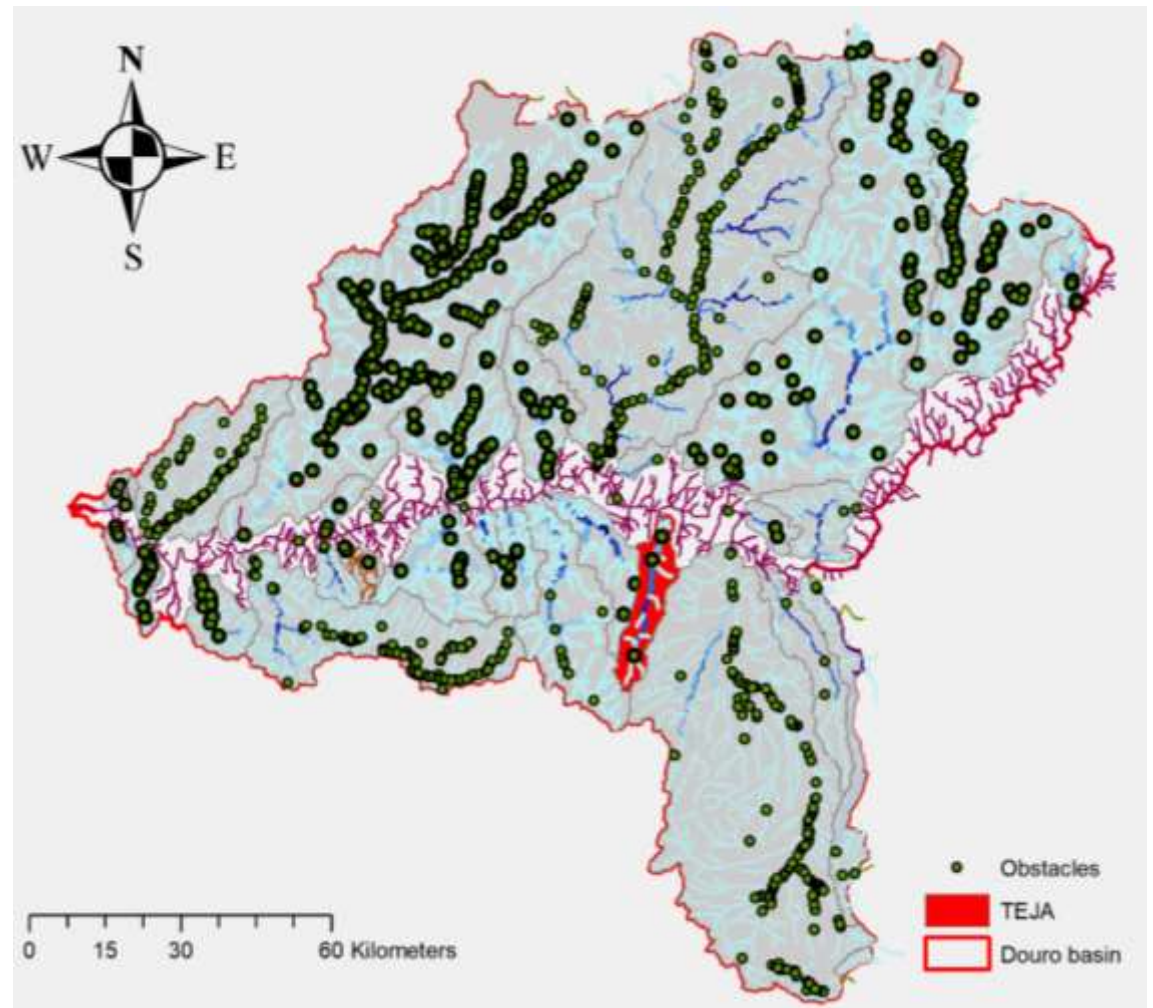



Figure 22: Highlight the Teja river

Table 73: Obstacles characteristics in Teja sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
552 – Catapereiro dam*	Ribeira da Teja	1	1		2	Yes			2	1	3	3	5		72383.2	158376.7		1
553 - Teja	Ribeira da Teja	1	1		2	Yes			2	1	3	3	5	Mini hydro Moinhos de Moiratao	66846.41	134670.4		2
1246	Ribeira da Teja	2	2	Yes	1	Yes			2	1	3	3		Affluent river. Ribeira do Prado.	70411.81	153727.7		

### Catapereiro dam


Table 74: Catapereiro dam charecteristics.

Infraestruture	Height (m)	Watershed area (km²)	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m³)	Useful capacity (m³)
	37.5	188	Concrete	Energy	430.1	134.4	-	4085,3 x 1000	4000 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Catapereiro dam

Table 75: Catapereiro dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	16	35.5	Landfill	Water supply	692	177	6	2805 x 1000	2743 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.

Table 76: Picture of the obstacle seen in field in Teja sub-basin.

Obstacles seen in field	
552	553
	



The Temilobos tributary (**Figure 23**) presents one obstacle, and it is a large dam. **Table 73** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

**Table 74** shows the specific characteristics of the large dam.

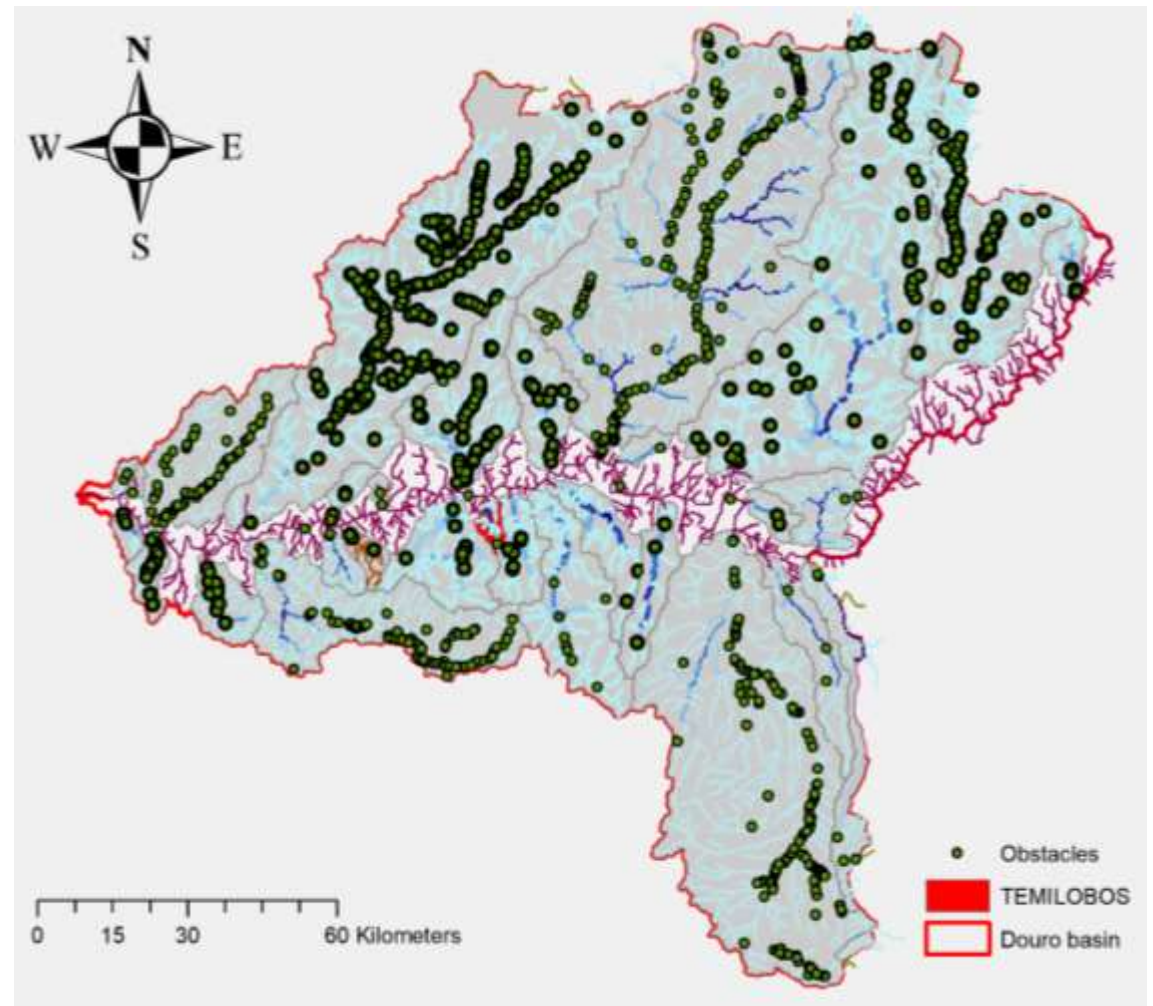


Figure 23: Highlight the Temilobos river.




Table 77: Obstacles characteristics in Temilobos sub-basin

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
562 - Armamar o dam*	Ribeira de Temilobos	1	1		2	Yes			2	4	3	3	5	Mini hydroArmamar	38757.52	154408.4		2

## Armamar dam

Table 78: Armamar dam charecteristics.

Infraestruture	Height (m)	Watershed area (km²)	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m³)	Useful capacity (m³)
	40.5	6.6	Landfill	Irrigation	756.5	365	7	2900 x 1000	2800x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.

## TINTO

The Tinto tributary (**Figure 24**) presents three obstacles. Of these, all are weirs. **Table 75** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

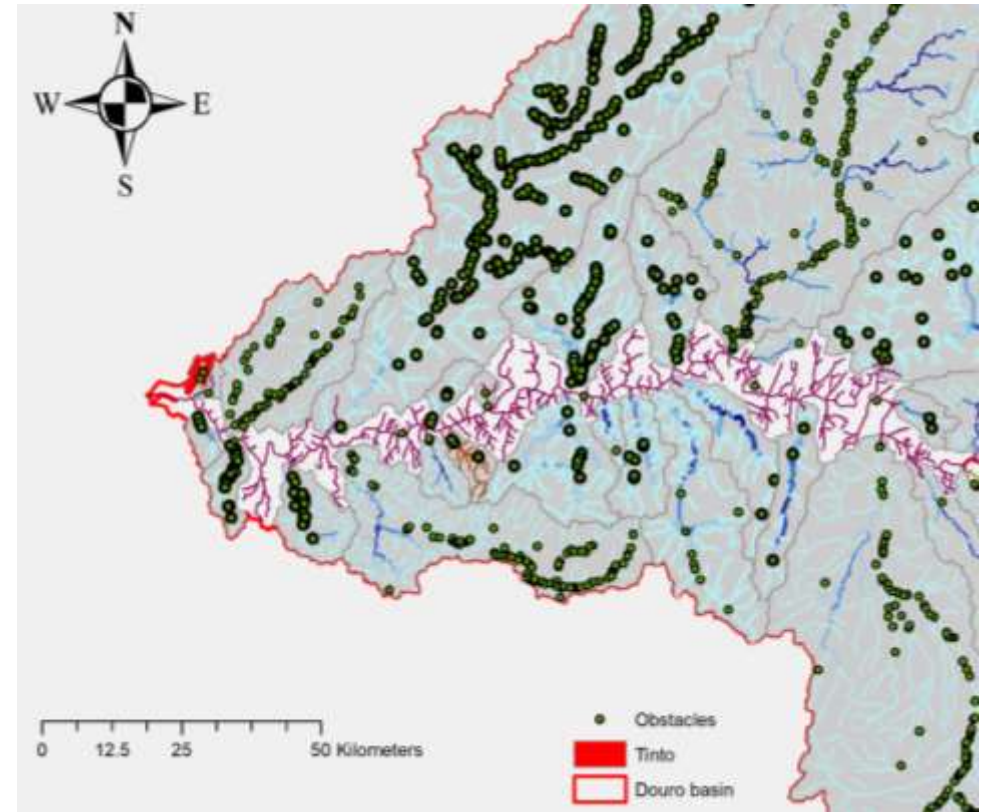


Figure 24: Highlight the Tinto river

Table 79: Obstacles characteristics in Tinto sub-basin

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
1283	Tinto	1	2	Yes	1	Yes			2	4	3	3			-36030.9	167245.4		
1284	Tinto	1	2	Yes	1	Yes			2	4	3	3			-35353	168610.8		
1470	Tinto	1	2	Yes	1	Yes			2	4	3	3			-35389.9	168463.7		

## TORTO - PORTO

The Torto - Porto tributary (**Figure 25**) presents one obstacle. **Table 76** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

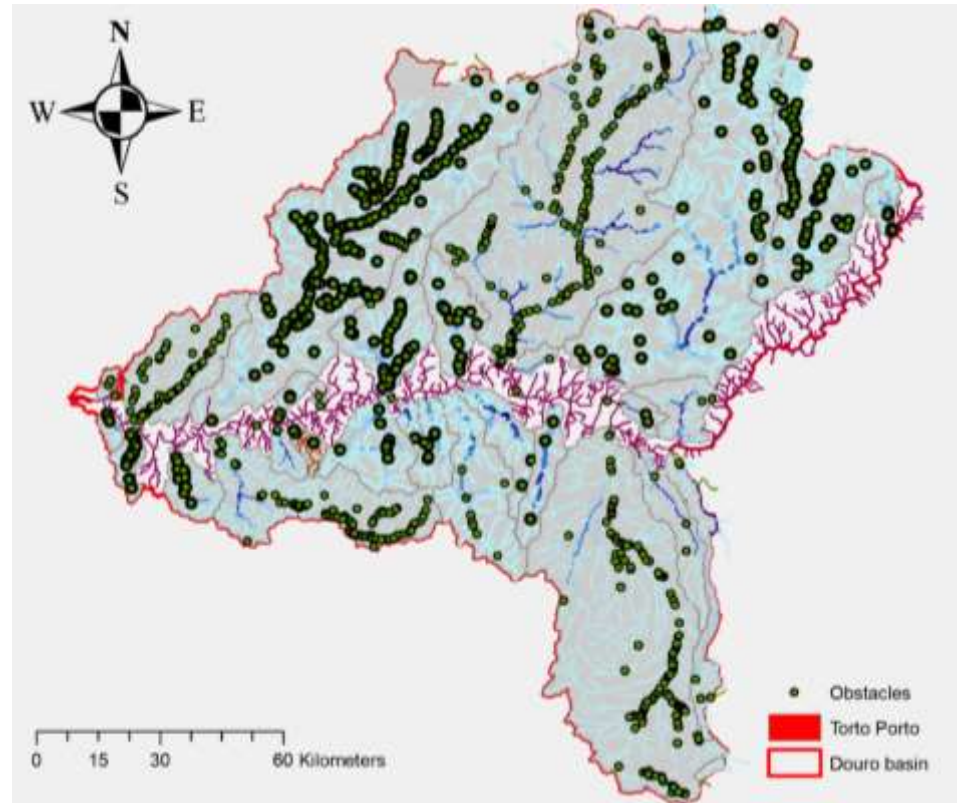


Figure 25: Highlight the Torto-Porto river

Table 80: Obstacles characteristics in Torto-Porto sub-basin

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
1377	Torto - Porto	1	2	Yes	1	Yes			2	4	3	3		Rio Torto-Porto	-34391.3	164661.6		

The Torto tributary (**Figure 26**) presents two obstacles and both are large dams. **Table 77** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

**Table 78** shows the specific characteristics of the large dam.

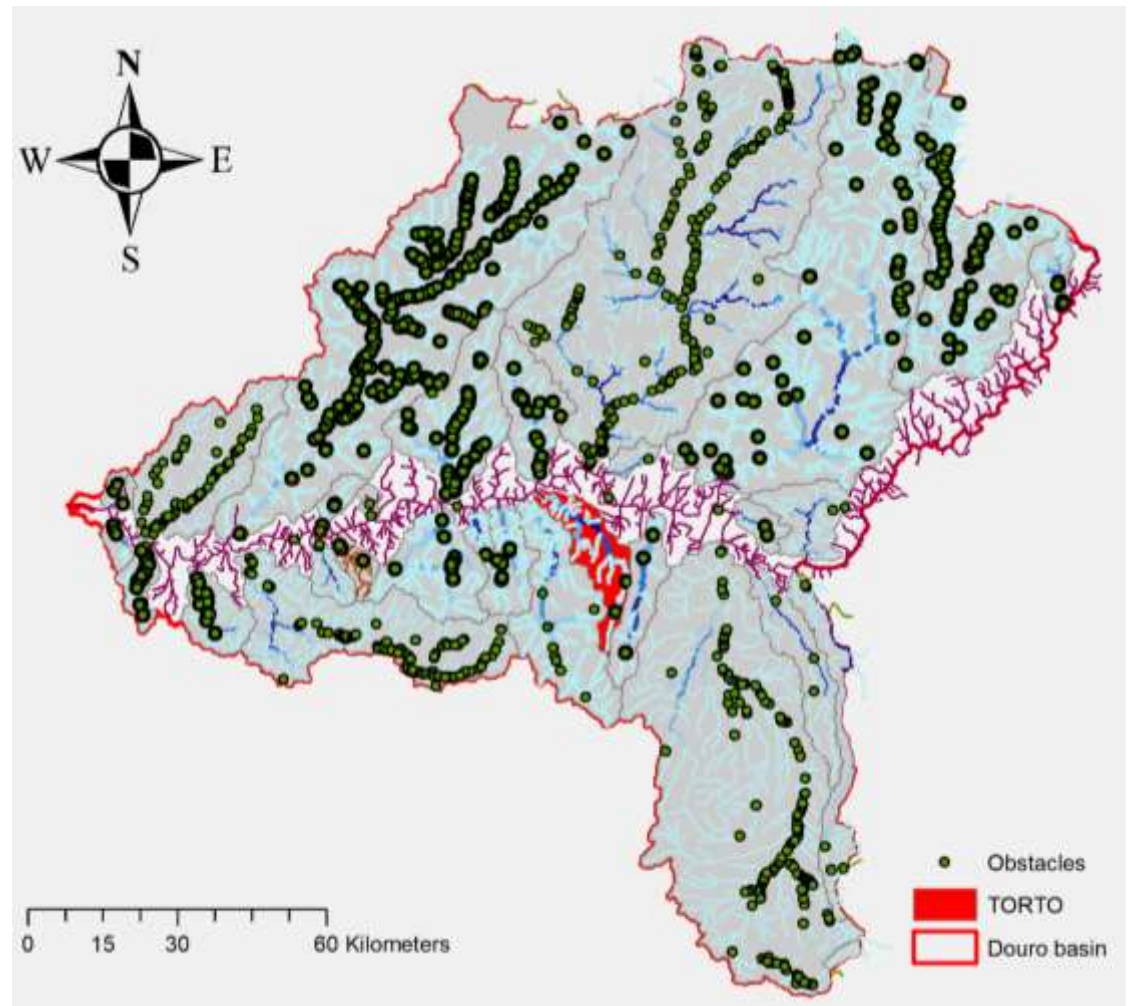



Figure 26: Highlight the Torto river

Table 81: Obstacles characteristics in Torto sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
554 – Ranhad os dam*	Torto	1	1		2	Yes			2	1	3	3		Barragem de Ranhados	67143.85	149045		2
555 – Ourozin ho dam	Torto	1	1	Yes	2	Yes			2	1	3	3		Barragem de Ourozinho	64819.44	142952.9		2

## Ranhados dam

Table 82: Ranhados dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	41.4	47.3	Concrete	Water supply	719	292	3	2570 x 1000	1790 x 1000

Source: [http://cnpqg.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqg.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.



The Tua tributary (**Figure 28**) presents 202 obstacles. Of these, 6 are Mini hydro and another 6 are large dams. **Table 79** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

**Table 80 and 85** shows the specific characteristics of the large dams.

In **table 79**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 86**.

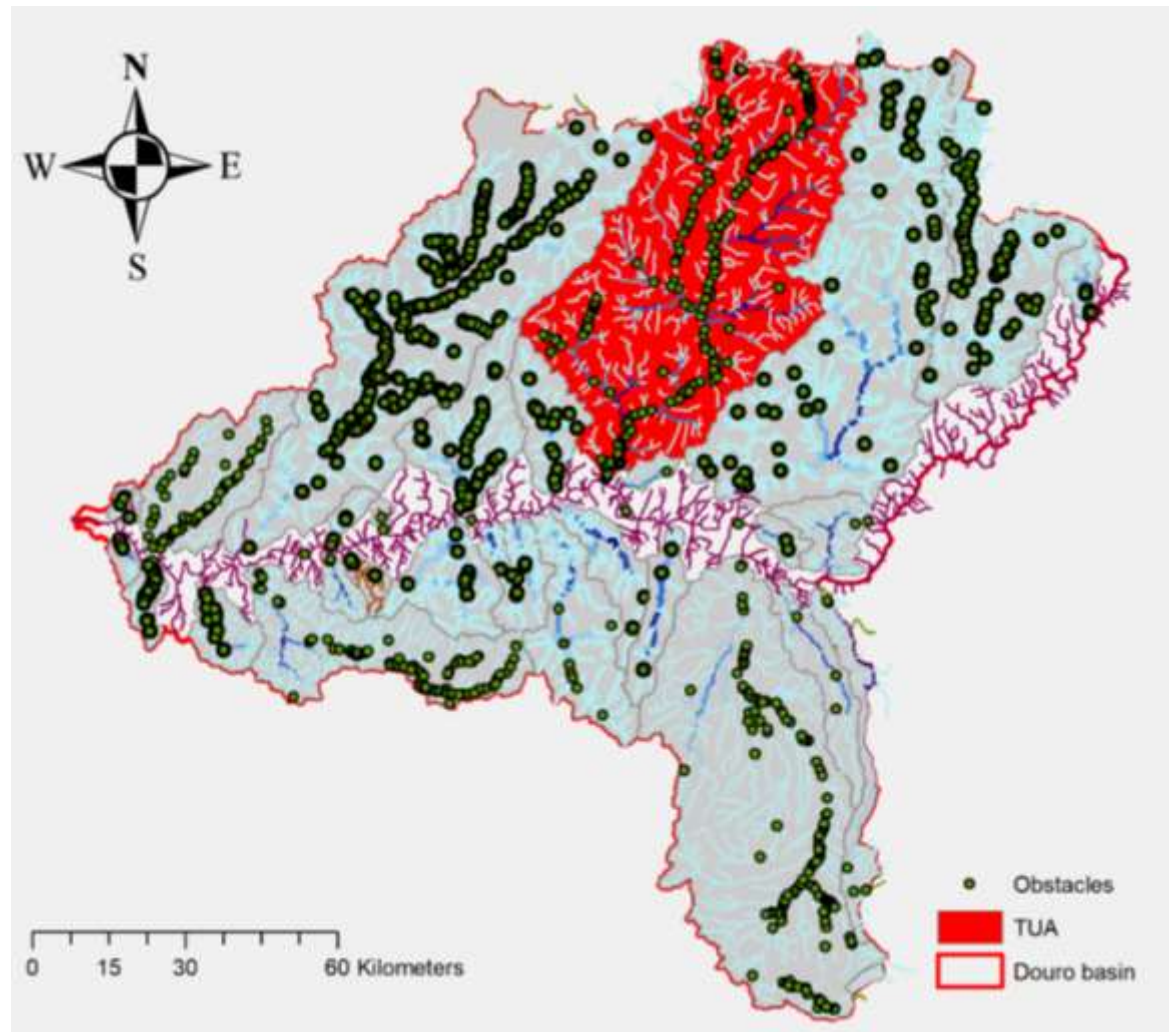


Figure 27: Highlight the Tua river.



Table 83: Obstacles characteristics in Tua sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
276	Tua	1	2		1	Yes			2	1	3	3		ruined	74439.21	188841.8		
277	Tua	1	2		1	Yes			2	1	3	3			74841.96	189344.4		
278	Tua	1	2		1	Yes			2	1	3	3			75714.27	189170		
260	Tua	2	1	Yes	2	Yes			2	1	3	3		Affluent river Rio Rabaçal.	73768.04	218202.8		2
288	Tua	1	2		1	Yes			2	1	3	3		ruined	80869.51	195930.4		
287	Tua	1	2		1	Yes			2	1	3	3		ruined	80783.87	195051.1		
290	Tua	1	2		1	Yes			2	1	3	3			78781.8	200452.1		
291	Tua	2	2		1	Yes			2	1	3	3		Affluent river. Rio Tuela.	79978.05	208090.6		
274	Tua	1	2		1	Yes			2	1	3	3			68476.24	185767.3		
275	Tua	1	2		2	Yes			2	1	3	3			73882.89	187938.4		
279	Tua	1	2		1	Yes			2	1	3	3		ruined	75923.15	189927.1		
280	Tua	1	2		1	Yes			2	1	3	3			76325.46	190562.6		
281	Tua	1	2		1	Yes			2	1	3	3		ruined	77027.83	190925.8		
282	Tua	1	2		1	Yes			2	1	3	3		ruined	77957.76	191435.6		
284	Tua	1	2		1	Yes			2	1	3	3			80806.23	191847.8		
285	Tua	1	2		1	Yes			2	1	3	3		ruined	80785.59	192537.7		
283	Tua	1	2		1	Yes			2	1	3	3		ruined	80716.98	191487.7		
293	Tua	2	2		1	Yes			2	1	3	3		Affluent river. Rio Tuela.	81015.47	215197		
299	Tua	2	2		2	Yes			2	4	3	3		Affluent river Rio Rabaçal.	72912.28	211259.8		
286	Tua	1	2		1	Yes			2	1	3	3		ruined	81147.99	193586.9		
294	Tua	2	2		1	Yes			2	1	3	3		Affluent river. Rio Tuela.	80930.25	217062		
295	Tua	2	2		1	Yes			2	1	3	3		Affluent river. Rio Tuela.	80341.01	217902.1		
300	Tua	2	2		1	Yes			2	1	3	3		ruined Affluent river Rio Rabaçal.	75335.83	221424.8		
296	Tua	2	2		2	Yes			2	1	3	3		Affluent river Rio Rabaçal.	76237.39	206038.2		
301	Tua	2	2		1	Yes			2	1	3	3		Affluent river Rio Rabaçal.	75853.85	222742.3		

297	Tua	2	2		1	Yes			2	1	3	3		Affluent river Rio Rabaçal.	75147	206694.1		
298	Tua	2	2		1	Yes			2	1	3	3		Affluent river Rio Rabaçal.	73703.24	209764.6		
302	Tua	2	2		1	Yes			2	1	3	3		Affluent river Rio Rabaçal.	76570.94	224892.7		
1556	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tinhela	49684.48	199666.6		
1557	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tinhela	50016.74	199346.4		
1558	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tinhela	49800.33	199597.5		
1559	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio de Curros	55209.35	201017.6		
1560	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river - Rio de Curros	55258.1	201229.2		
1561	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river - Rio de Curros	55241.41	201506.8		
1562	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Curros	55320.43	201546.7		
1563	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Curros	55305.57	201413.3		
351 - Mini hydro Ponte – Europa*	Tua	1	1		2	Yes			2	4	3	3	5		78952.41	201716.8		2
352 - Mini hydro Nunes*	Tua	2	1		2	Yes			2	1	3	3	5	Rio Tuela, Affluent river	97924.96	240163.7	S	1
353 - Mini hydro Trutas	Tua	2	1		2	Yes			2	1	3	3	5	Rio Tuela, Affluent river	98899.53	241136.5	S	1
292	Tua	2	2		1	Yes			2	1	3	3		ruined Affluent river. Rio Tuela.	80808.58	214640.1		
262 - Bouçoães- Sonin dam	Tua	2	1		2	Yes			2	1	3	3	5	Affluent river Rio Rabaçal.	78061.41	229126.9		2

264 – Rebordelo dam*	Tua	2	1		2	Yes			2	1	3	3	2	Affluent river Rio Rabaçal.	79551.42	232235.8		1
1576	Tua	2	2	Yes	1	Yes			2	4	3	3		Affluent river. Ribeira de Sao Mamede	0	0		
1577	Tua	2	2	Yes	2	Yes			2	4	3	3		Affluent river. Ribeira de Sao Mamede	0	0		
1578	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river	0	0		
1579	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river	0	0		
1580	Tua	2	2	Yes	2	Yes			2	1	3	3		Affluent river	0	0		
1581	Tua	2	2		2	Yes			2	1	3	3		Affluent river	0	0		
1582	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river	0	0		
1583	Tua	2	2	Yes	2	Yes			2	4	3	3		Affluent river	0	0		
1584	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river	0	0		
1585	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river	0	0		
1586	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river	0	0		
1587	Tua	2	2		1	Yes			2	1	3	3		Affluent river	0	0		
1588	Tua	2	2		1	Yes			2	1	3	3		Affluent river	0	0		
1589	Tua	2	2		1	Yes			2	1	3	3		Affluent river	0	0		
1590	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river	0	0		
1591	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river	0	0		
1592	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river	0	0		
957	Tua	1	2	Yes	1	Yes			2	1	3	3			62518.74	178404.4		
953	Tua	1	2	Yes	1	Yes			2	1	3	3			62294.14	177520.2		
954	Tua	1	2	Yes	1	Yes			2	1	3	3			62378	177691.9		
955	Tua	1	2	Yes	1	Yes			2	1	3	3			62497.03	178281		
956	Tua	1	2	Yes	1	Yes			2	1	3	3			62309.31	178844.9		
958	Tua	1	2	Yes	1	Yes			2	1	3	3			61995.8	179161.3		
959	Tua	1	2	Yes	1	Yes			2	1	3	3			62644.81	180188.1		
960	Tua	1	2	Yes	1	Yes			2	1	3	3			63035.3	180389.2		
961	Tua	1	2	Yes	1	Yes			2	1	3	3			63297.58	180546.6		
962	Tua	1	2	Yes	1	Yes			2	1	3	3			63595.86	180658		
963	Tua	1	2	Yes	1	Yes			2	1	3	3			64396.84	181862.8		
964	Tua	1	2	Yes	1	Yes			2	1	3	3			63415.76	183027.6		
965	Tua	1	2	Yes	1	Yes			2	1	3	3			63930.55	183451.9		
966	Tua	1	2	Yes	1	Yes			2	1	3	3			64868.81	184717.3		
967	Tua	1	2	Yes	1	Yes			2	1	3	3			65388.11	184909.1		

998	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	88264.96	233204.4		
987	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	82444.11	222880.9		
1003	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	88699.33	234099.6		
988	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	82977.24	223057.5		
989	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	83951.6	224139.3		
993	Tua	2	2		1	Yes			2	1	3	3		ruined Affluent river- Rio Tuela.	85945.39	229374		
1004	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	88818.74	234413.6		
995	Tua	2	2		1	Yes			2	1	3	3		Affluent river- Rio Tuela.	86948	230427.4		
997	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	88484.97	233689.2		
1005	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	89574.88	234879.1		
1008	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	90132.67	235433.3		
225	Tua	1	2	Yes	2	Yes			2	1	3	3			79000.88	198590.5		
237	Tua	2	2		2	Yes	Yes		2	1	3	3		Affluent river Rio Tuela.	80599.66	212200.1		
234	Tua	2	2		2	Yes	Yes		2	1	3	3		Affluent river Rio Tuela.	79240.68	207691		
1015	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	92487.85	236409.1		
230	Tua	1	2	Yes	2	Yes			2	1	3	3			78153.65	204323		
235	Tua	2	2		1	Yes			2	1	3	3		Afluyente do rio Tua. Rio Tuela.	79941.9	209238.4		
224	Tua	1	2	Yes	1	Yes			2	1	3	3			80766.96	193785.1		
236	Tua	2	2		1	Yes			2	1	3	3		Afluyente do rio Tua. Rio Tuela.	79584.37	209741.9		
1010	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tua.	90681.23	235974.8		
1013	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	92558.9	236720.5		

1014	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	92696.77	236854		
1016	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	91899.62	236101.6		
1020	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	92469.72	236290.6		
1028	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	94506.19	238995.2		
1114	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	83698.97	243546.1		
254 - Mini hydro Vales	Tua	2	1		2	Yes			2	1	3	3	5	Affluent river Rio Tinhela.	50622.48	198443.2		2
350 - Mini hydro Torga	Tua	2	1		2	Yes			2	1	3	3	5	Rio Tuela Affluent river Identificada a passagem de peixe.	84555.17	226793.3	S	2
259 - Vale Madeiro dam*	Tua	2	1		2	Yes			2	1	3	3	1	Affluent river.	83901.03	201814.5		2
273	Tua	1	2		1	Yes			2	1	3	3			66684.41	185373.9		
253 – Prada dam*	Tua	2	1		2	Yes			2	1	3	3	1	Affluent river Rio Tuela.	95547.95	244717		2
270 – Cachão dam	Tua	2	1		2	Yes			2	1	3	3		Affluent river Barragem do Cachão.	81417.44	192273.3		2
272 – Tua dam	Tua	1	1		2	Yes			2	1	3	3	2	Barragem Foz Tua.	59582.22	172415.1		1
232	Tua	2	2		1	Yes			2	1	3	3		Affluent river Rio Tuela.	78565.55	205851.6		
1543	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tinhela	49598.76	199575.8		
1545	Tua	2	2		1	Yes			2	1	3	3		Affluent river- Rio de Curros	54999.7	200504		
1544	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river	47168.18	200532.9		
1549	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river	57655.81	207801.5		
1550	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river	72445.81	210184.4		

1548	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river - Rio de Curros	55986.53	203357.3		
1547	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river - Rio de Curros	56112.17	202306.4		
1546	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river - Rio de Curros	56020.16	202136.7		
938	Tua	1	2	Yes	1	Yes			2	1	3	3			59713.75	172841.7		
939	Tua	1	2	Yes	1	Yes			2	1	3	3			59799.6	173209.9		
940	Tua	1	2	Yes	1	Yes			2	1	3	3			59579.53	174636.4		
942	Tua	1	2	Yes	1	Yes			2	1	3	3			59836.36	175059.6		
943	Tua	1	2	Yes	1	Yes			2	1	3	3			61065.35	175281.2		
944	Tua	1	2	Yes	1	Yes			2	1	3	3			61491.02	175231.7		
945	Tua	1	2	Yes	1	Yes			2	1	3	3			60551.23	175543.6		
946	Tua	1	2	Yes	1	Yes			2	1	3	3			61962	175131.9		
947	Tua	1	2	Yes	1	Yes			2	1	3	3			62487.21	175233.4		
948	Tua	1	2	Yes	1	Yes			2	1	3	3			62427.36	175688.8		
949	Tua	1	2	Yes	1	Yes			2	1	3	3			62204.58	175867.9		
950	Tua	1	2	Yes	1	Yes			2	1	3	3			62107.37	176476.7		
951	Tua	1	2	Yes	1	Yes			2	1	3	3			61947	176837.7		
952	Tua	1	2	Yes	1	Yes			2	1	3	3			61863.96	177254.6		
969	Tua	1	2	Yes	1	Yes			2	1	3	3			72149.18	187419.6		
971	Tua	1	2	Yes	1	Yes			2	1	3	3			75932.37	189461.4		
974	Tua	1	2	Yes	1	Yes			2	1	3	3		ruined	80387.23	197250.9		
975	Tua	1	2	Yes	1	Yes			2	1	3	3			79091.12	197883.4		
976	Tua	2	2		1	Yes			2	1	3	3		ruined Affluent river- Rio Tuella	79841.76	210864.5		
978	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuella	80912.41	213297.6		
980	Tua	2	2	Yes	1	Yes			2	4	3	3		ruined Affluent river- Rio Tuella	80793.76	214514.3		
983	Tua	1	2	Yes	1	Yes			2	1	3	3			81005.94	219496.5		
984	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuella	81196.82	220455.3		
985	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuella	81811.57	221756.6		
986	Tua	2	2		1	Yes			2	1	3	3		Affluent river- Rio Tuella	81997.06	222015.4		



1023	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	94159.04	237790.7		
1024	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	94004.72	238161.1		
1025	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	94039.02	238481.4		
1029	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	94963.82	239421.6		
1032	Tua	2	2		1	Yes			2	1	3	3		Affluent river- Rio Tuela	99281.14	242050.9		
1034	Tua	2	2	Yes	1	Yes			2	1	3	3		ruined Affluent river- Rio Tuela	99509.77	242627.3		
1050	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	99813.56	244942.8		
1051	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	99865.54	245364.1		
1053	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	99646.52	245893.7		
1054	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	99516.86	246292		
1055	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	99610.91	246891.6		
1056	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	99491.41	247204.9		
1057	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	99507.96	247406		
1058	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	99591.41	247730.6		
1059	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	99524.85	247853.6		
1060	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	99173.7	248122.2		
1061	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	99224.44	248455.5		
1062	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	98737.72	250194.4		
1063	Tua	2	2	Yes	1				2	1	3	3		Affluent river- Rio Tuela.	99167.86	248891.2		


1065	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	98831.88	250924.3		
1067	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	98835.88	251453.6		
1068	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	97630.57	251892.3		
1069	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	97065.64	252010.5		
1070	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	96742.69	252543.9		
1071	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela.	96546.82	252995.5		
1075	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal.	73214.72	215145.4		
1076	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	73170.58	214879		
1079	Tua	2	2		1	Yes			2	1	3	3		Affluent river- Rio Rabacal	74089.21	217134.8		
1082	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	76557.94	224142.1		
1084	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal.	76985.34	227458		
1085	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	79874.92	230892.3		
1086	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	78102.05	235197.6		
1087	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	77592.67	237553.8		
1088	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	76989.93	241526.1		
1089	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal- Rio Mente	78168.44	244557.1		
1095	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	81645.7	235941.3		
1098	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	82673.39	237053		
1102	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal.	83208.34	238679.5		

1112	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal.	83169.53	242695.1		
1115	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	84019.73	243815.3		
1116	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	83974.51	244010.2		
1117	Tua	2	2	Yes	1	Yes			2	1	3	3			84012.13	244133.9		
1118	Tua	2	2	Yes	1	Yes	Yes		2	1	3	3		Affluent river- Rio Rabacal	84157.55	244507.9		
1119	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	82584.27	244890.8		
1120	Tua	2	2		1	Yes			2	1	3	3		Affluent river- Rio Rabacal.	82492.2	246248.5		
1121	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal.	82755.59	246770.3		
1123	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	81998.2	251672.4		
1124	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	81412.89	252049		
1125	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal.	81262.62	254652.7		
1126	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal.	80828.55	254875.2		
1128	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal.	80985.07	255529.4		
1130	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal.	81016.59	255681.4		
1131	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal.	81042.55	255932.2		
1132	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Assureira	85649.4	252707.2		
1134	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Assureira	86095.94	252572.2		
1135	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Assureira	86095.13	252946.2		
1138	Tua	2	2		2	Yes			2	1	3	3		Affluent river- Ribeira da Carvalha	83391.07	195212		
1417	Tua	2	2	Yes	3	Yes			2	1	3	3		Affluent river	93588.11	209834.3		

1458	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Tuela	98750.77	249582.3		
1459	Tua	2	2	Yes	1	Yes			2	1	3	3		Rio Rabacal	74812.44	220572.2		
1460	Tua	2	2	Yes	1	Yes			2	1	3	3		Affluent river- Rio Rabacal	82061.31	236491.3		

## Mirandela mini hydro


Table 84: Ponte Mirandela mini hydro charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	21	2715	Mobile weir	Landscape enhancement (water mirror) / Supply / Energy / Flood defense / Recreation	219.5	139	-	515 x 1000	-

Source: [http://cnpgeb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpgeb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Nunes mini hydro


Table 85: Nunes mini hydrocharecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	21.5	406	Concrete	Energy	542.3	65.5	-	138 x 1000	98 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Bouçoais dam


Table 86: Bouçoais dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	43	867	Concrete	Energy	341	87	-	1365 x 1000	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Rebordelo dam


Table 87: Rebordelo dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	35.5	846	Concrete	Energy	387.5	127	-	3130 x 1000	-

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

## Vale madeiro dam

Table 88: Vale madeiro dam charecteristics.


Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	29.6	44	landfill	irrigation	294.5	186.3	7	1509 x 1000	1335 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)







## Prada dam

Table 89: Prada dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	19.2	3.63	landfill	irrigation	933.2	150.3	6	247 x 1000	233 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

Table 90: Picture of the obstacle seen in field in Tua sub-basin.

Obstacles seen in field			
224	232	286	296
			

\* The barriers identified are shown in Table 96, showing more details of data about them.

The Uima tributary (**Figure 28**) presents 31 obstacles. Of these, two are mini hydro infrastructures. **Table 87** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

In **table 87**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 88**.

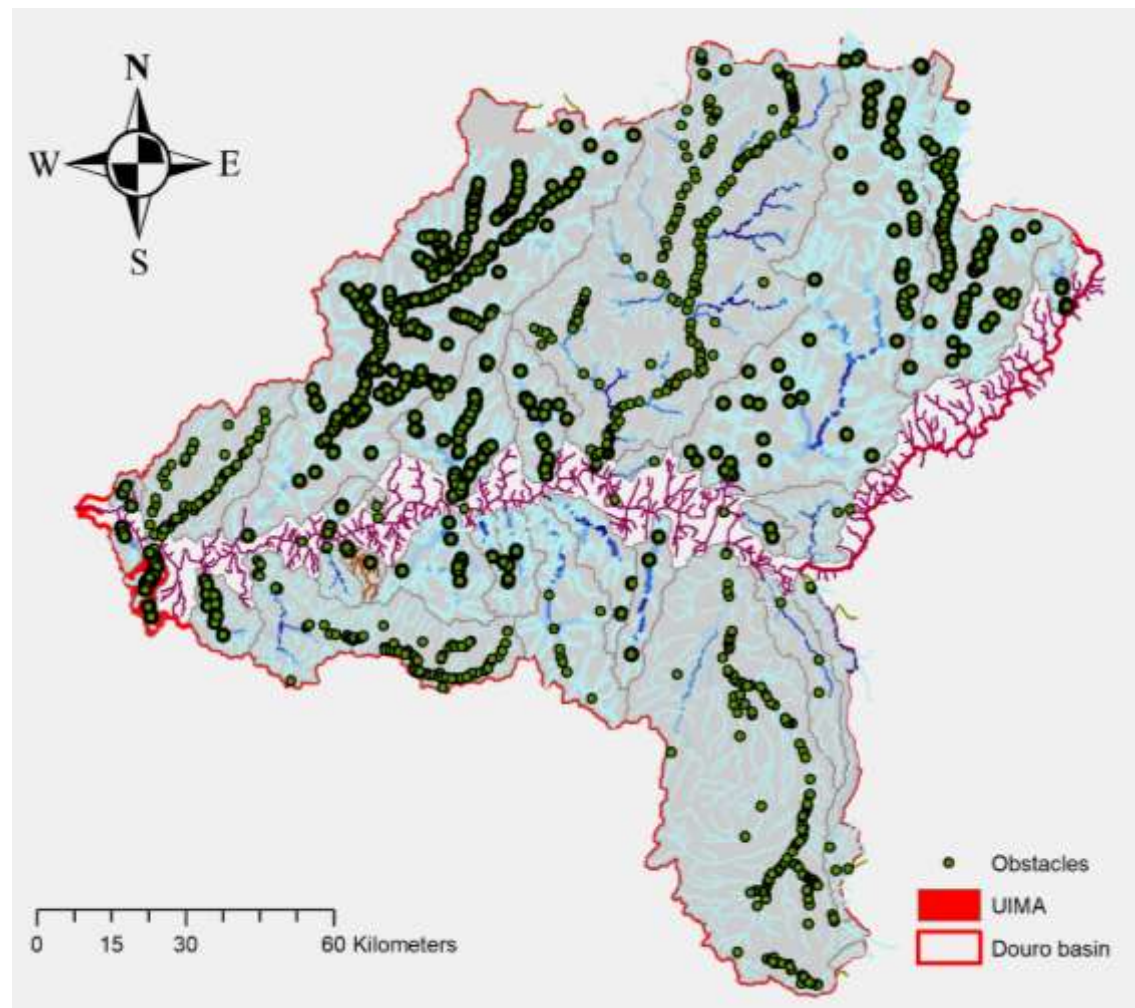


Figure 28: Highlight the Uima river.

Table 91: Obstacles characteristics in Uima sub-basin

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
575	Uima	1	2	Yes	2	Yes			2	4	3	3			-30741.6	144454		
576	Uima	1	2		1	Yes			2	4	3	3		Affluent river	-30322.1	142316.1		
574 - Mini hydro Chelo/Mouraes	Uima	1	1	Yes	2				2	1	3	3	5	Mini hydroChelo/Mouraes	-29716.5	154267.9		2
573 - Mini hydro Hortas.	Uima	1	1		2	Yes			2	1	3	3	5	Mini hydroHortas.	-29876.7	154988.8	S	2
1254	Uima	1	2	Yes	1	Yes			2	4	3	3			-29570.2	154505		
1255	Uima	1	2		1	Yes			2	4	3	3			-29598.6	153979.2		
1256	Uima	1	2	Yes	1	Yes			2	4	3	3			-29410.3	153645.3		
1257	Uima	1	2	Yes	1	Yes			2	4	3	3			-29590.5	153136.8		
1258	Uima	1	2	Yes	1	Yes			2	4	3	3			-29138.7	152466.5		
1259	Uima	2	2	Yes	1	Yes			2	4	3	3		Affluent river	-30059.5	151176.1		
1260	Uima	1	2	Yes	1	Yes			2	4	3	3			-29958.7	151077.2		
1261	Uima	1	2	Yes	1	Yes			2	4	3	3			-29918.6	150715.4		
1262	Uima	1	2		1	Yes			2	4	3	3			-29744.7	150595.1		
1263	Uima	1	2	Yes	1	Yes			2	4	3	3			-30274.1	150052.5		
1264	Uima	1	2	Yes	1	Yes			2	1	3	3			-30451.4	149824.4		
1265	Uima	1	2	Yes	1	Yes			2	4	3	3			-30615.7	149698.9		
1266	Uima	1	2	Yes	1	Yes			2	4	3	3			-30600.9	149500.3		
1267	Uima	1	2	Yes	1	Yes			2	4	3	3			-30925.5	149381.5		
1268	Uima	1	2	Yes	1	Yes			2	4	3	3			-30987.2	149357.1		
1269	Uima	1	2	Yes	1	Yes			2	4	3	3			-31258.9	149424.9		
1270	Uima	1	2		1	Yes			2	4	3	3			-31107.4	149257.1		
1271	Uima	1	2	Yes	1	Yes			2	4	3	3			-31354.1	149173.6		
1272	Uima	1	2	Yes	1	Yes			2	4	3	3			-31464.6	149028.2		
1273	Uima	1	2	Yes	1	Yes			2	4	3	3			-31354.1	148700.4		
1274	Uima	1	2		1	Yes			2	4	3	3			-31353.7	148509.8		
1275	Uima	1	2		1	Yes			2	4	3	3			-31373.7	148369.1		
1276	Uima	1	2	Yes	1	Yes			2	4	3	3			-31520.2	147697.3		
1277	Uima	2	2	Yes	2	Yes			2	4	3	3		Affluent river.	-30861.4	144410.1		

1278	Uima	2	2	Yes	2	Yes			2	4	3	3			-30874.6	144389.2		
1376	Uima	1	2	Yes	1	Yes			2	4	3	3			-30554.3	155267.8		
1612	Uima			Yes		Yes				4	3	3			0	0		

Table 92: Picture of the obstacle seen in field in Tua sub-basin.

Obstacles seen in field			
575	1257	1263	1612
			



The Varosa tributary (**Figure 29**) presents 9 obstacles. Of these, two are large infrastructures and one mini hydro. **Table 89** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

**Table 90** and **91** shows the specific characteristics of the large dams.

In **table 89**, the obstacles highlighted in green, were seen in the field and some pictures of them are shown in **table 92**.

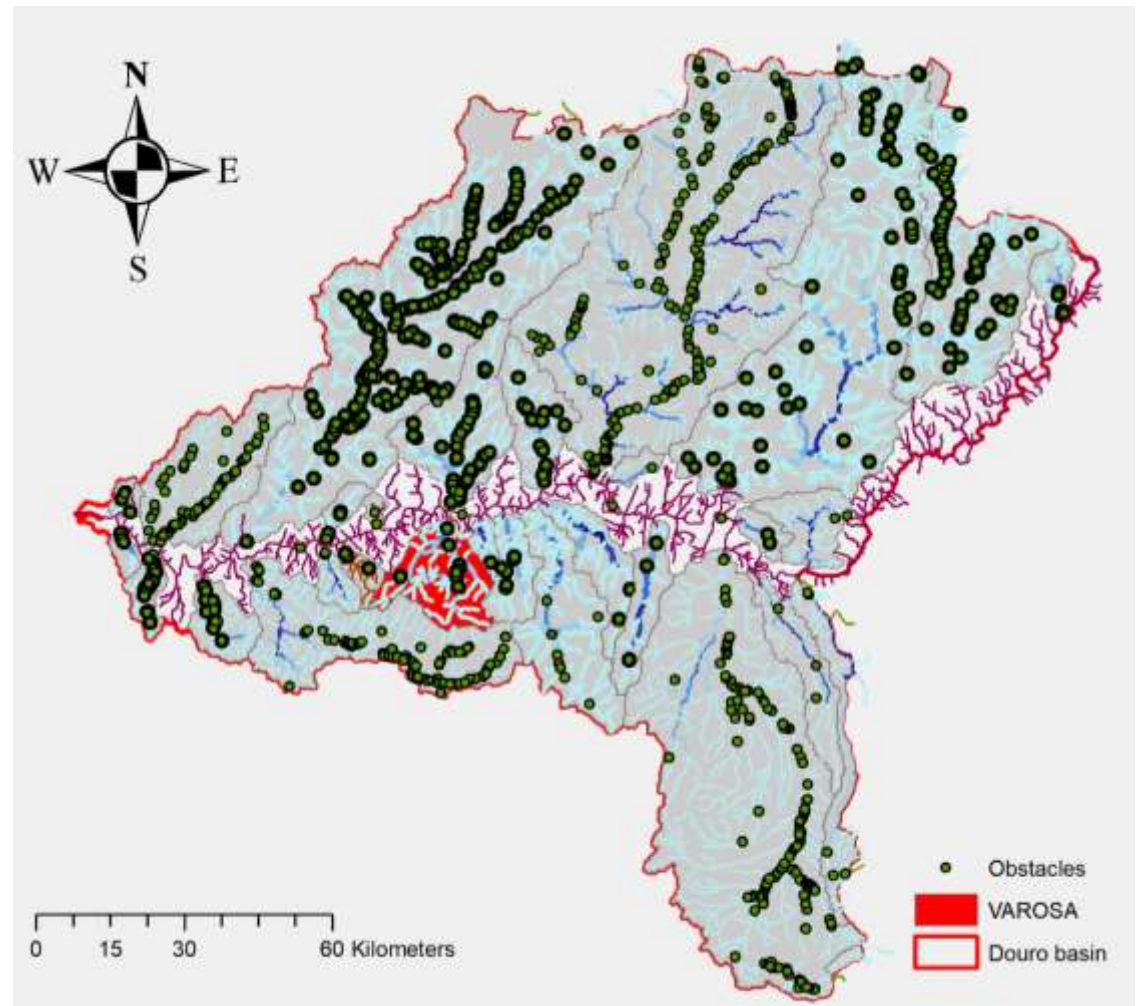



Figure 29: Highlight the Varosa river.

Table 93: Obstacles characteristics in Varosa sub-basin

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
1281	Varosa	1	1	Yes	2	Yes			2	4	3	3			31816.11	151649.7		2
565 – Pretarouca dam	Varosa	2	1		2	Yes			2	1	3	3		Affluent river-Rio Balsemao.	20445.35	151623.1		2
563 - Varosa - Grande hídrica*	Varosa	1	1		2	Yes			2	1	3	3		Grande-hídrica Varosa.	29957.12	161341.5		1
564 - Mini hydro Ucanha-Gouviães	Varosa	1	1		2	Yes			2	1	3	3	5	Mini hydroUcanha-Gouviães	32521.16	153943.1	S	2
1279	Varosa	1	2	Yes	1	Yes			2	1	3	3			30336.29	157989		
1280	Varosa	1	2	Yes	1	Yes			2	4	3	3			32346.06	153186.4		
1282	Varosa	1	2	Yes	1	Yes			2	4	3	3			32183.47	149563.3		
1468	Varosa	1	2	Yes	1	Yes			2	4	3	3			32096.78	153044.3		
1469	Varosa	1	2	Yes	1	Yes			2	4	3	3			31871.61	152474.7		

## Pretarouca dam

Table 94: Pretarouca dam charecteristics.


Infraestruture	Height (m)	Watershed area (km²)	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (hm³)	Useful capacity (hm³)
	28.5	24	concrete	Water supply	922.5	305.5	7.5	3,219	3,219

Source: [http://cnpbg.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpbg.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)



## Varosa dam

Table 95: Varosa dam charecteristics.

Infraestruture	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	76	24	concrete	energy	265	213	3.44	12943 x 1000	12937 x 1000

Source: [http://cnpqb.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqb.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.

Table 96: Picture of the obstacle seen in field in Varosa sub-basin

Obstacles seen in field	
1281	1469
	

The Verga tributary (**Figure 30**) presents one obstacle that is a large dam. **Table 93** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

**Table 94** shows the specific characteristics of the large dams.

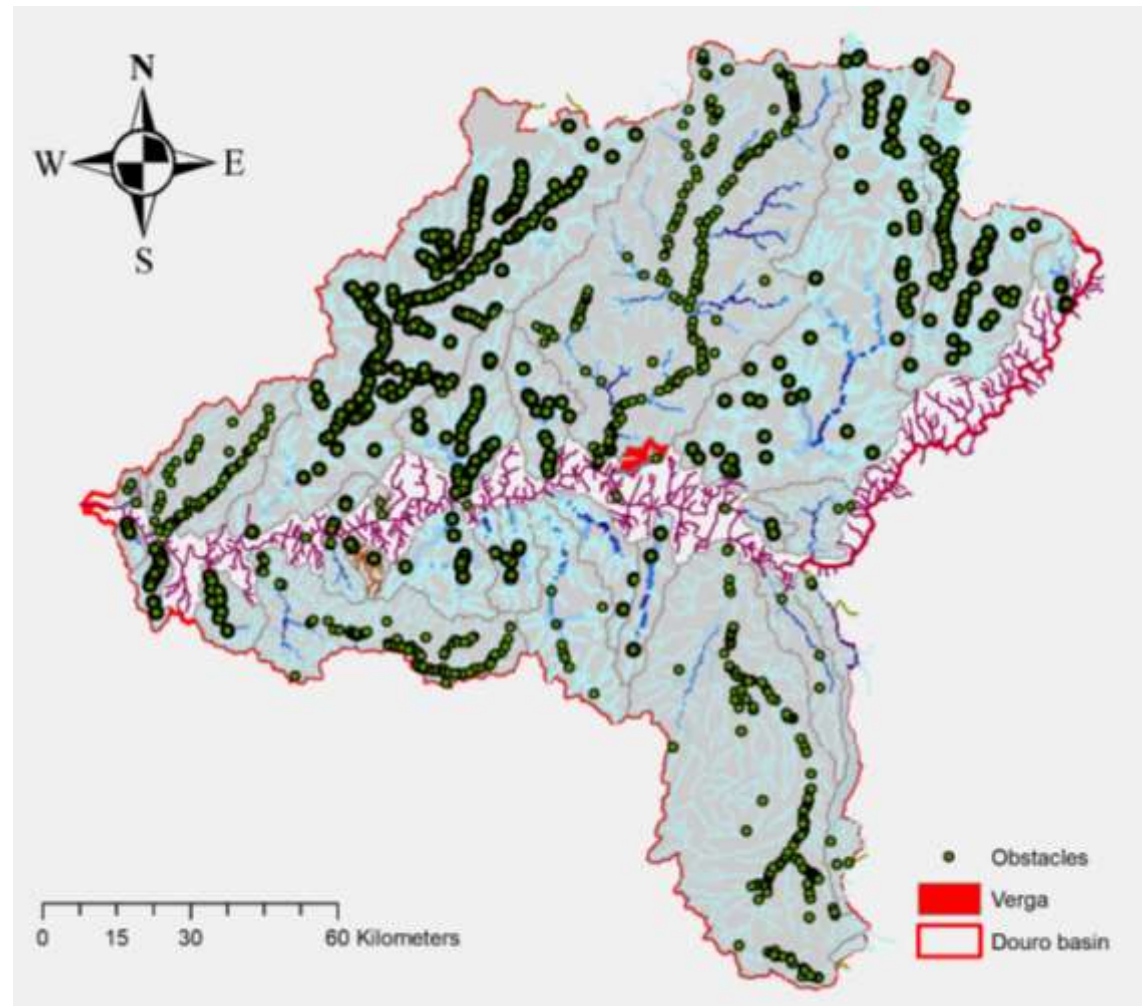



Figure 30: Highlight the Verga river

Table 97: Obstacle characteristic in Verga sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
538 - Barragem da Fonte Longa *	Ribeira de Linhares	2	1		2	Yes			2	1	3	3		Afluente-Ribeira da Verga. Barragem da Fonte Longa.O aproveitamento da Barragem é de abastecimento	71497.8	173678.6		2

## Fonte Longa dam

Table 98: Fonte Longa dam characteristics.

Infraestrutura	Height (m)	Watershed area (km <sup>2</sup> )	Type	Use	Crowning elevation (m)	Crowning length (m)	Crowning width (m)	Full capacity (m <sup>3</sup> )	Useful capacity (m <sup>3</sup> )
	22	3.01	landfill	Water supply	759.5	415	-	900 x 1000	800 x 1000

Source: [http://cnpqg.apambiente.pt/gr\\_barragens/gbportugal/Mapanorte.htm](http://cnpqg.apambiente.pt/gr_barragens/gbportugal/Mapanorte.htm)

\* The barriers identified are shown in Table 96, showing more details of data about them.

The Zêzere tributary (**Figure 31**) presents two obstacles. Of these, one is a mini hydro infrastructure. **Table 94** shows the characteristics collected at the time of the inventory, the caption is in **Annex I**.

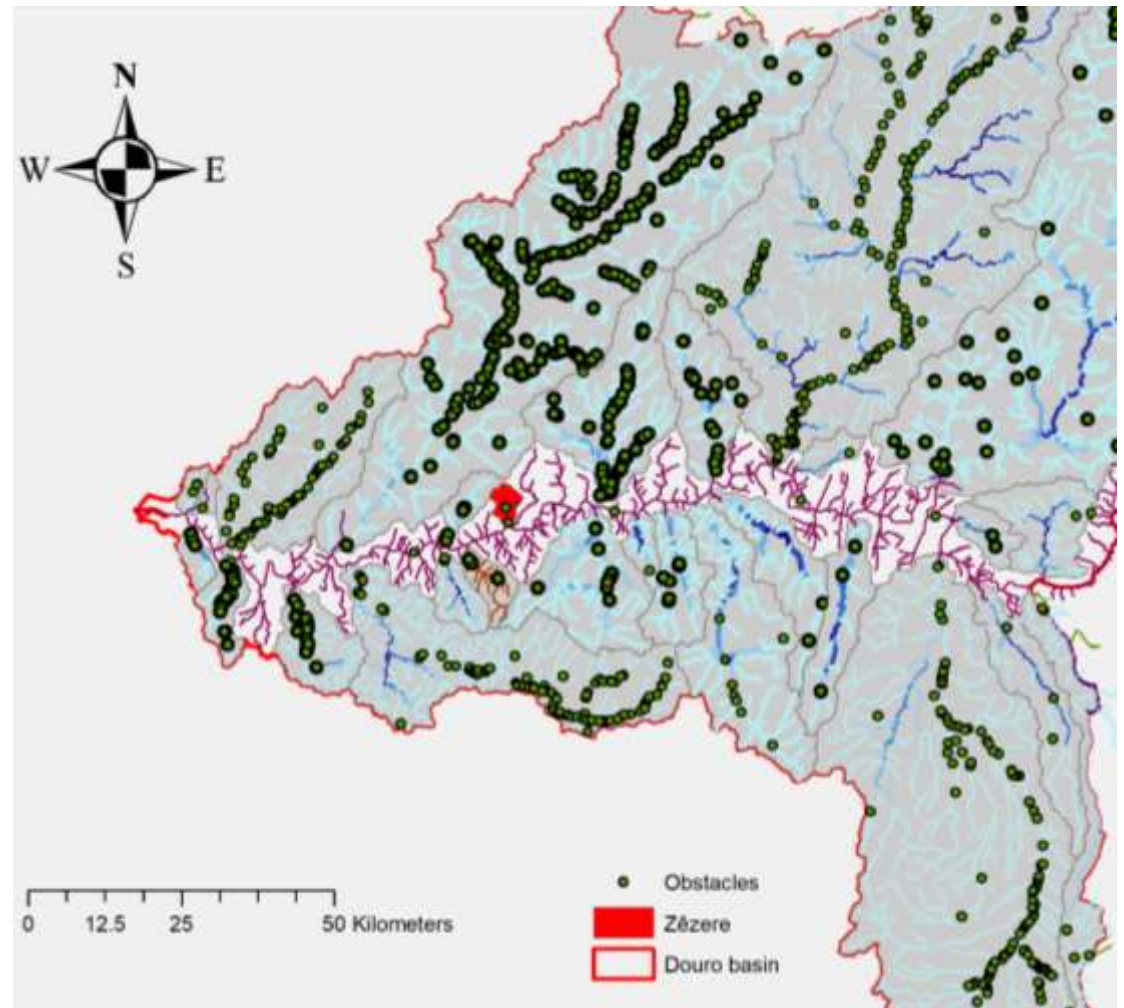


Figure 31: Highlight the Zêzere river

Table 99: Obstacles characteristics in Zêzere sub-basin.

Weirs name	River name	Category	Type	Doubt	Weirs type	Regolfo	Mill	Levada	Galery type	Land use	Auto ac	Pedonal ac	Desc use	Observation	xx	yy	Fish pass	Barrier shape
490 - Mini hydro Assobio	Ribeira do Zerere	1	1	Yes	2	Yes			2	1	3	3	5	Mini hydro Assobio.	15646.28	162243.9		2
1383	Ribeira do Zerere	1	2	Yes	1	Yes			2	4	3	3			15240.83	164701.1		

## Large Dams Inventory

Some of the barriers have different characteristics and some data is available on them. As a rule, they are larger and have certain characteristics that are extremely important for the normal functioning of communities. Some examples of this are dams supplying water to the population, producing energy, for irrigation, among others. Table 96 shows these barriers, which have already been mentioned throughout this report (marked with \*) and others that are present in the main water line of the Douro River.

Table 96: Obstacles characteristics in Zêzere sub-basin.

Barrier Name	River	Year (end of construction)	Type	Height (m)	Flooded area (ha)	Basin area (km <sup>2</sup> )	Reservoir area (*1000 m <sup>2</sup> )	Gross capacity (*1000 m <sup>3</sup> )	Normal Water Level (m)	Maximum flood level (m)	Minimum operating level (m)	Mean annual rainfall (mm)	Flood runoff (m <sup>3</sup> /s)	Height above foundation (m)	Height above streambed (m)	Installed power (MW)	Average annual production (GWh)	Number and type of turbine
ALFAIATES *	Côa	1999	Irrigation	20	22	20	220	854	801	802.5	795.5	620.3	106	20	16	-	-	-
ALFÂNDEGA DA FÉ	Ribeira dos Alambiques	1970	Water Supply / Irrigation	27	22	0.7	220	1600	626.5	626.7	607	-	-	27	25	-	-	-
ALIJO	Ribeira da Chã	1991	Water Supply	40	18	9	180	1740	658.5	659.9	640	900	72	40	36	-	-	-
ARCOSSÓ *	Ribeira de Arcossó	1999	Water Supply	40	41.2	31.1	412	4876	537	538.25	-	915.4	113	40	-	-	-	-
ARMAMAR *	Ribeira de Temilobos	2004	Irrigation	40.5	32	-	-	-	-	-	-	-	-	-	-	-	-	-
AZIBO *	Sabor	1982	Irrigation	56	410	91	4100	54470	602	603.65	575	715	350	56	52	-	-	-
BAIXO SABOR *	Sabor	2016	Energy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BASTELOS	Ribeira de Bastelos	1993	Water Supply	23.2	17.6	26	176	1200	624	625.4	-	-	153	23.2	22	-	-	-



BEMPOSTA	Douro	1964	Energy	87	405	63850	4050	129000	402	-	-	582	11000	87	-	210	1086	3 Francis
BEMPOSTA II	Douro	2011	Energy	-	-	63850	-	-	-	-	-	-	-	-	-	-	-	1 Francis
BOUÇOAIS – SONIM *	Rabaçal/Tua	2004	Energy	43	1.53	-	-	-	-	-	-	-	-	-	-	-	-	-
BURGA *	Sabor	1978	Irrigation	35	16.1	16	161	1539	329	330.5	307	700	190	35	28	-	-	-
CAMBA *	Sabor	1993	Water Supply / Irrigation	35	9.5	6	95	1110	620.43	622	598	925	95	35	30	-	-	-
CARRAPATELO	Douro	1972	Energy / Navigation	57	950.2	92050	9520	148400	46.5	-	-	582	22000	57	-	201	870.6	3 Kaplan
CATAPEREIRO *	Teja	1999	Energy	37.5	43.5	188	435	4085.3	427.5	429.57	-	689.08	248.08	37.5	33.5	4	-	2 Pelton com eixo horizontal
CEREJO *	Côa	-	Irrigation	25.5	68	-	-	-	-	-	-	-	-	-	-	-	-	-
CRESTUMA-LEVER	Douro	1985	Energy / Water Supply / Navigation	65	1200.98	92040	12980	110000	13	21.5	-	1078	26000	65	-	108	366.9	3 Kaplan
CURALHA *	Tâmega	1985	Irrigation	16	17.7	5	177	792	405	405.4	-	-	500	16	12	-	-	-
DAMA *	Távora	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FERRADOSA *	Douro	-	Water Supply	30	7.94	-	-	-	-	-	-	-	-	-	-	-	-	-
FONTE LONGA *	Verga	1984	Water Supply	22	90	3.01	900	800	757.5	758	-	-	22	22	20	-	-	-
FREIGIL *	Cabrum	1955	Energy	17	3.3	54	33	140	317	-	-	2267	400	17	-	4.6	10.3	1 Francis

GOSTEI/ castanheira *	Ribeira de Gostei	1993	Irrigation	35	14.9	4.5	149	1384	758	758.65	736	275	59	35	33	-	-	-
MAIROS *	Tâmega	1995	Irrigation	23.5	6.7	2.21	67	369	800	801.46	778.3	-	10.3	23.5	20.5	-	-	-
MIRANDA	Douro	1961	Energy	80	122													
MIRANDELA *	Tua	-	Water Supply / Energy / Flood protection / Recreation			2715	138	515	212.7	216.5	-	941.3	4000	21	12.5	-	-	-
NUNES *	Tuela/ Tua	1995	Energy	21.5	13.8	406	-	138	535.5	541.3	532	1291.1	1350	21.5	18.5	9.9	41.56	
-OLGAS*	Ribeira do Arroio	2006	Water Supply	31.5	13.5	-	-	-	-	-	-	-	-	-	-	-	-	-
PALAMEIRO *	Sabor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PICOTE	Douro	1958	Energy	100	244	63750	2440	63000	471	478	-	582	11000	100	-	180	1038	3 Francis
PICOTE II	Douro	2011	Energy	-	-	63750	-	-	-	-	-	-	-	-	-	-	-	-
PINHÃO *	Pinhão	-	Storage	22	50.5	-	-	-	-	-	-	-	-	-	-	-	-	-
POCINHO	Douro	1982	Energy / Navigation	49	829	81005	8290	83070	125.5	134.5	-	582	15100	49	-	186	534	3 Kaplan
PRADA *	Tua	1995	Irrigation	19.2	4.6	3.63	46	247	931.5	932.2	921.75	-	-	19.2	18	-	-	-
RANHADOS *	Torto	1986	Water Supply	41.4	17.8	47.3	178	2570	716	717.4	701.3	802	265	41.4	38.4	-	-	-
REBORDELO *	Rabaçal/ Tua	2004	Energy	35.5	46	-	-	-	-	-	-	-	-	-	-	-	-	-
REGO DO MILHO *	Tâmega	2005	Aterro		184	-	-	-	-	-	-	-	-	-	-	-	-	-
RÉGUA	Douro	1973	Energy / Navigation	41	850	90800	8500	95000	73.5	-	-	582	21500	41	-	156	738	3 Kaplan

RIBEIRO GRANDE E ARCO *	Sabor	2009	Irrigation	36.9	59.6	-	-	-	-	-	-	-	-	-	-	-	-	-
SABUGAL *	Côa	2000	Rega / Water Supply / Energy	58.5	732	130	7320	114300	790	791.81	774	1248	569	58.5	794	-	-	-
SALGUEIRO *	Sabor	1977	Irrigation	28	22	3.85	220	1800	222	222.5	204.5	550	45	28	25	-	-	-
SAMBADE *	Sabor	2009	Water Supply	29	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-
SANTA JUSTA *	Sabor	2005	Irrigation	39.3	28	-	-	-	-	-	-	-	-	-	-	-	-	-
SANTA Mª DE AGUIAR *	Ribeira de Aguiar	1981	Water Supply / Rega	20	110	128.5	1100	5400	620	621.28	612	508	350	20	-	-	-	-
SRª DE MONFORTE *	Côa	1993	Energy	20	2.3	1100	23	87.3	435	439.9	433	568	800	20	18	10	32.9	2 Francis
SERRA SERRADA *	Ribeira das Andorinhas	1989	Water Supply	25	25	6.7	264.7	1680	1252	1252.5	1241.5	1400	46	25	20	3.4	8.71	2 Pelton
SOEIRO *	Paiva	1994	Energy	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SORDO *	Sordo	1997	Water Supply / Energy	36	8.4	48	84	1000	522.5	525.5	507	2169	365	36	33	10	25	2 Pelton
TEJA *	Teja	1995	Water Supply	16	-	35.5	-	2805	689.5	690.74	680	860.8	121	-	16	-	-	-
TORRÃO *	Tâmega	1988	Energy	69	650	3252.1	6500	124000	65	65	49	1273	4150	69	-	146	228	
VALE MADEIRO *	Tua	2004	Rega	19.6	183	-	-	-	-	-	-	-	-	-	-	-	-	-

VALTORNO *	Ribeira de Valtorno	2018	Rega / Water Supply	32	11	14.49	-	-	-	-	-	-	66	32	-	-	-	-
VALEIRA	Douro	1975	Energy / Navigation	48	795	85400	7950	97000	105	-	-	582	17700	48	-	216	801	3 Kaplan
VAROSA *	Varosa	1934	Energy	77	70		700	12937	264	265	-	1500	1200	-	76	24.7	60	3 Francis
VASCOVEIRO *	Ribeira da Pega	2000	Water Supply	19	57	110	570	3000	591	593.2	582.2	779	306	23	19	-	-	-
VERMIOSA *	Ribeira de Aguiar	1999	Irrigation	18	48.9	11.9	489	2250	684.8	686.3	674.2	542.7	74	18	15.5	-	-	-
VILAR *	Távora	1965	Energy	58	670	360	6700	99750	552	-	-	929.6	500	58	55	64	148	2 Pelton

## Conclusions

After all the work of surveying spatial and field data of all the obstacles, dams and weirs, has been done, we verify that in total there are 1201 barriers. From these barriers, we excluded the 5 large hydroelectric dams from the main tributary of the Douro River, and thus obtained a total of 1196 barriers belonging to the affluent rivers of the Douro River were obtained for 29 sub-basins (**Table 97**).

*Table 100: summary of the type of barriers in the different sub-basins.*

Sub basin	Number of Dams	Number of Mini hydro	Number of weirs	Total
Aguiar	2	-	1	3
Arda	1	-	20	21
Arroio	2	-	-	2
Águeda	-	-	5	5
Bestança	-	-	4	4
Cabrum	2	-	1	3
Côa	5	5	140	150
Corgo	2	-	60	62
Febros	2	-	2	4
Freixo	1	-	1	2
Fresno	-	-	9	9
Ovil	-	1	6	7
Paiva	-	4	115	119
Pinhão	2	-	18	20
Sabor	11	1	135	147
Sousa	-	2	79	81
Tâmega	7	14	265	286
Távora	2	2	5	9
Tedo	-	1	6	7
Teja	1	1	1	3
Temilobos	1	-	-	1
Tinto	-	-	3	3
Torto-Porto	-	-	1	1
Torto	2	-	-	2
Tua	6	6	190	202
Varosa	2	1	6	9
Verga	1	-	-	1
Uima	-	2	29	31
Zêzere	-	1	1	2
<b>Total</b>				<b>1196</b>

Of all the sub-basins in Douro River basin, 152 barriers were seen in the field, and only in these is it possible to have a real notion of their conservation status, usefulness and activity. Thus, from the barriers visited in the field, it was found that the Corgo River basin has one totally destroyed weir, the Tâmega river has 4 totally destroyed weirs and in the Tua river we find 19 weirs totally destroyed. Regarding the difficulty of access, the Côa, Sousa, Corgo, Sabor, Tâmega and Uima rivers presented a weir without access, and

on the Tua river two weirs without access, therefore it is not possible to collect data for the analysis of fragmentation.



## Annex I

### Barriers Database

Layer name – Barriers\_douRoPT

Field Name	Database Type	Description
Cod_ident	Text	
Weirs name	Text	Name of the barrier, if it exists.
Category	Short Integer	River category.
Type	Short Integer	Obstacle type.
Doubt	Short Integer	Always point out that the photo interpreter has doubts about the existence of an obstacle. Information to be validated in the fieldwork.
Weirs type	Short Integer	Material used in the construction of the barrier.
Regolfo	Short Integer	Presence or absence of elevation of the water level upstream of an obstacle located in the riverbed.
Mill	Short Integer	Presence or absence of water mills or water intake.
Levada	Short Integer	Presence or absence of water intake.
Galer type	Short Integer	Characterization of the river curtain at 100 m upstream and downstream of the obstacle.
Land use	Short Integer	Characterization of the dominant land use in the area surrounding the obstacle (1km radius).

Auto ac	Short Integer	Describes the quality of the road access network to the obstacle, for 4x4 vehicles.
Pedonal ac	Short Integer	Describes the quality of the road access network to the obstacle, for people.
Desc use	Short Integer	Description of use
Country	Short Integer	Country where obstacle is located
Observation	Text	
Xx	Short Integer	Coordinate X (ETRS PTM 06)
Yy	Short Integer	Coordinate Y (ETRS PTM 06)
Dicotow	Short Integer	District County Town Code
Fish_pass	Short Integer	Presence or absence of fish passage

#### Field - Category

Value	Description
1	Principal
2	Secondary

#### Field – Type

Value	Description
1	Dam
2	Weirs
3	Manila
4	Others

#### Field – Doubt

Value	Description
1	Yes
2	No

Field – Weirs Type

Value	Description
1	Riprap
2	Concrete
3	Land
4	Others

Field – Regolfo

Value	Description
1	Yes
2	No

Field – Mill

Value	Description
1	Yes
2	No

Field – Levada

Value	Description
1	Yes
2	No

Campo – Gallery Type

Value	Description
1	Continue
2	Sparse
3	nonexistent

Field – Land use

Value	Description
1	Agricultural
2	Bush
3	Forest
4	Others

**Field – Auto access**

Valor	Description
1	No access
2	Bad
3	Good
4	Reasonable

**Field – Pedonal access**

Value	Description
1	No access
2	Bad
3	Good
4	Reasonable

**Field – Desc aprov**

Value	Description
1	Irrigation
2	Large-hydro
3	Recreation
4	Mills
5	Mini -hydro

**Field – Fish\_Pass**

Value	Description
1	Yes
2	No

**Field – Barrier shape**

Value	Description
1	Concave
2	Linear

## Bibliography

[1] McKay, S.K.; Cooper, A.R.; Diebel, M.W.; Elkins, D.; Oldford, G.; Roghair, C.; Wieferich, D. Informing Watershed Connectivity Barrier Prioritization Decisions: A Synthesis. *River Res. Appl.* **2017**, *33*, 847–862.