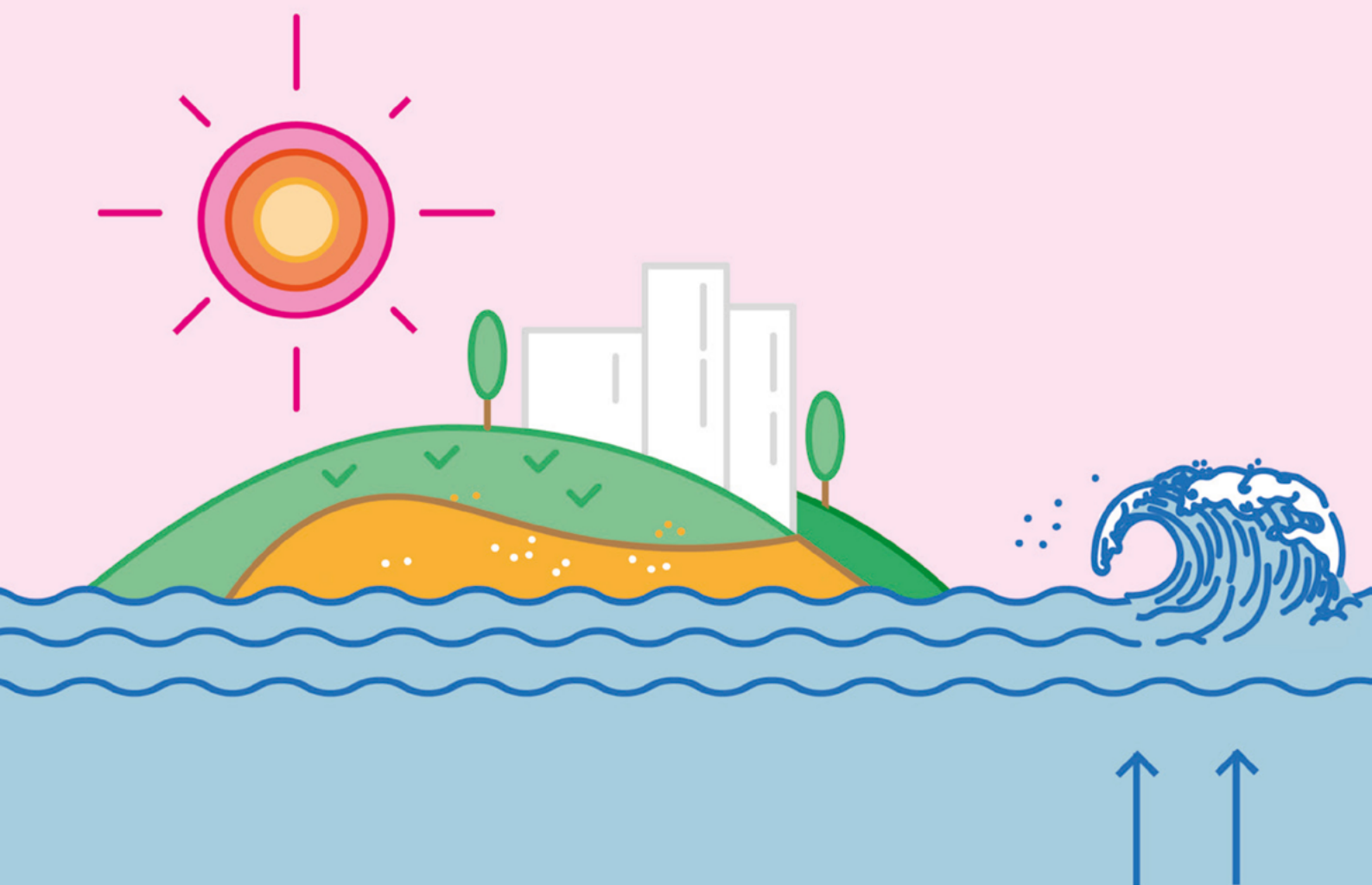


KOSTAEGOKI

Basque coast's vulnerability, risk and adaptation to climate change.

I. Vulnerability and risk assessment



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Edited by:

Ihobe, ingurumen-kudeaketarako sozietate publikoa
Department for Industry, Energy Transition and Sustainability
Basque Government

C/Alameda de Urquijo, 36 6^a Planta
48011 Bilbao
Tel: 944 23 07 43
www.ihobe.eus

Content:

This document was prepared by AZTI for Ihobe.

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EXECUTIVE SUMMARY

The KOSTAEGOKI project is part of the Spanish Plan to Promote the Environment (PIMA) Adapta Costas CCAA 2017 of the then Ministry of Agriculture and Fisheries, Food and Environment - MAPAMA and now the Ministry for the Ecological Transition and the Demographic Challenge aimed at the Autonomous Communities, to develop the National Climate Change Adaptation Plan (PNACC).

The aim of the KOSTAEGOKI project is to provide information and tools to the competent bodies relating to the effects of the rise in average sea level caused by climate change (CC) and the impact of waves on the Basque coast, with a view to using them to plan and manage coastal areas in order to meet the challenges posed by this global phenomenon.

A number of operational goals, grouped into phases, have been set to achieve this main aim. This document summarises the vulnerability and risk assessment.

The aim of Phase I is to estimate the impact of marine climate change and risks on socio-economic systems and the natural environment. In the case of socio-economic systems, the likely consequences of the **impacts of coastal flooding and erosion** were estimated for different proposed scenarios. As far as the natural system is concerned, the impact on habitats and species on the coast due to flooding was analysed under the same proposed climate scenarios.

The results that include geo-referenced information are publicly available on the GIS viewer website <https://gis.ihobe.eus/kostaegoki> and, partially, on the geoEuskadi website (<https://www.geo.euskadi.eus>).

In addition to this report, the document **“Kostaegoki II. Guidelines for Adapting to Climate Change on the Basque coast”** has been drawn up.

METHODOLOGY:

The flood modelling took the following into account: waves, meteorological tides, astronomical tides and mean sea level. Wave data along the coastal strip (at -20 m) are from the downscaled ocean waves (DOW) dataset (Camus et al. 2013). As certain areas along the coast require a higher degree of accuracy, the marine climate in port regions and bays (e.g. the Bilbao area or La Concha Bay) was propagated with the SWAM model, using an updated bathymetry of the Basque coast with a 1 m resolution (Galparsoro et al., 2009). Meteorological tide data were obtained from the GOS 1.1 database (Cid, 2014). Astronomical tides were reconstructed using the harmonic constants of the Bilbao and Pasaia tide gauges. The flood levels associated with return periods (RP) of 100 and 500 years come from adjusting the extreme regime using the generalised extreme value (GEV) approach by means of annual maximums. Flood mapping was carried out using a geographic information system (GIS), a set of auxiliary programmes and the input data generated and collected (Digital Elevation Model - DEM, reference scenarios and future scenarios). The DEM from the Basque Government's topographic LIDAR survey in 2016 was used¹. Buildings and constructions have been removed in this DEM to show the bare ground surface with a horizontal resolution of 1 m.

Flood maps were produced for the entire Basque coast in ten climate scenarios:

- Two scenarios of the current climate: one with a 100-year RP and the other with a 500-year RP;
- Two other climate scenarios for the 2050 time horizon consider a mean sea level rise of +26 cm (mean value of the IPCC RCP4.5 and RCP8.5 scenarios for the Basque coast modified locally using Slangen et al., 2014) with 100-year and 500-year RPs, respectively.
- Four climate scenarios for the 2100 time horizon originate from combining sea level rises of +51 cm +70 cm (mean values of the IPCC RCP4.5 and RCP8.5 scenarios for the Basque coast modified locally using Slangen et al., 2014) with 100-year and 500-year RPs, respectively.
- The last scenario is a pessimistic one showing a mean sea level rise of +100 cm by the 2100 time horizon and RP of 100 and 500 years.

Subsequently, following the same methodology, flood maps for a further thirty scenarios, associated to 5, 10, 25, 50 and 200 year RPs, have been included: five in the current climate, ten in the 2050 time horizon with a mean sea level rise of +26 cm, and fifteen in the 2100 time horizon considering +51 cm, +70 cm and 1 m of sea level rise. However, the socio-economic and environmental impacts have been estimated only for the 100 and 500 year RP scenarios, except for the affected population indicator.

¹ <ftp://ftp.geo.euskadi.eus/lidar/MDE LIDAR 2016 ETRS89/MDT/>

A shoreline evolution model was applied to model beach erosion, taking short- and long-term processes into account. The transportation of sediment along the coast due to variations in sea levels due to waves, astronomical tides, meteorological tides and sea level rise was modelled. Erosion was analysed on sandy and wave-dominated beaches, of which there are twenty-eight in the Basque Country. A detailed description of the model used can be found in the article published by de Santiago et al. 2021. Four climate scenarios were considered when analysing the risks of beach erosion:

- One for the 2050 time horizon with a +26 cm rise in the mean sea level corresponding to the medium IPCC RCP8.5 scenario.
- Three for the 2100 time horizon of +51 cm, +70 cm and +100 cm mean sea level rises corresponding to the of medium RCP4.5 scenario and the medium and maximum RCP8.5 scenarios.

In this update the calculation of beach retreat related to the 5, 10, 25, 50, 100 and 200 year extreme wave RP for each of the four climate scenarios considered has been included. The erosion associated with these return periods, caused by the current wave effect, was added to the erosion caused by sea level rise in the selected climate scenarios. Thus, six scenarios were added for the current climate (5, 10, 25, 50, 100 and 200 year RP waves), seven scenarios for the 2050 time horizon climate and 21 scenarios for the 2100 time horizon (no waves and 5, 10, 25, 50, 100 and 200 year RP waves at both horizons).

The risk analysis method used follows the guidelines set out in the pilot study carried out in Asturias by IHCantabria², guidelines that stem from the report *Climate Change 2014: Impacts, Adaptation, and Vulnerability* (IPCC 2014a) prepared and published by the Intergovernmental Panel on Climate Change (IPCC).

More specifically, the risk of erosion on beach tourism was estimated following the methodology applied in Asturias (Toimil et al., 2018). The consequences of erosion in terms of the loss of value of recreational use per m² of beach were evaluated for the 28 beaches studied.

² <https://www.miteco.gob.es/es/costas/temas/proteccion-costa/estrategia-adaptacion-cambio-climatico/default.aspx>

RESULTS:

This project shows the flood maps along the Basque coast and some areas in detail as examples. The annexes include tables of estimates for potentially affected municipalities for the following indicators: surface area, population, employment by economic activity, and lastly, industrial³ and residential land area.

The estimated impacts are for the current socio-economic and territorial situation without any possible adaptation measures

Overall, the resulting level of impact on the different compartments analysed (population, areas at risk of flooding, economic values, beaches, infrastructure and the natural environment) will be moderate in 2050, while in 2100 the level of severity will depend on the emissions scenario and, therefore, the sea level rise scenario.

Surface area:

The area at risk of coastal flooding would increase by approximately 12% in 2050 and by 24% in 2100 to 59%. This would mean an increase from about 1,700 ha today to about 1,900 ha, 2,100 ha and 2,700 ha, respectively, in the three 2100 scenarios.

HECTARES OF POTENTIALLY AFFECTED AREA IN THE BASQUE COUNTRY

CLIMATE SCENARIO	FLOODED LAND AREA
1-Current return period of 100 years	1,676
2-Current return period of 500 years	1,734
3-2050 26 cm return period of 100 years	1,929
4-2050 26 cm return period of 500 years	1,972
5-2100 51 cm return period of 100 years	2,135
6-2100 70 cm return period of 100 years	2,179
7-2100 51 cm return period of 500 years	2,301
8-2100 70 cm return period of 500 years	2,386
9-2100 1 m return period of 100 years	2,659
10-2100 1 m return period of 500 years	2,718

³ Udalplan's layer of industrial land relating to economic activities.

Hondarribia and Gauteviz-Arteaga would have the largest areas potentially affected, with slightly more than 210 ha in the worst-case scenario (a sea level rise of +1 m combined with a 500-year RP, Scenario 10). The least affected municipalities would be **Amoroto, Ajangiz, Loiu and Zestoa** with less than 1 hectare affected under the same scenario. The surface area at risk in each municipality is listed in the annexes.

Population:

Three different demographic scenarios were considered: one where the population is expected to remain constant; one where the population increases (10.68% in 2050 and 11.60% in 2100) and one in which the population decreases (12.94% in 2050 and 19.81% in 2100). These scenarios were taken from the EUSTAT 2018 projections.

Considering the scenario where the population remains constant, the number of people potentially affected by flooding in 2050 could be twice as many as the current figure, and between three and five times as many by 2100, rising from approximately 8,000 people currently affected to 15,000, 22,000 and 42,000 people at risk in the three scenarios for 2100.

NUMBER OF PEOPLE POTENTIALLY AFFECTED IN THE BASQUE COUNTRY UNDER A SCENARIO WHERE THE POPULATION REMAINS CONSTANT

CLIMATE SCENARIO	POPULATION AFFECTED
1-Current return period of 100 years	7,847
2-Current return period of 500 years	8,515
3-2050 26 cm return period of 100 years	15,008
4-2050 26 cm return period of 500 years	15,697
5-2100 51 cm return period of 100 years	21,932
6-2100 70 cm return period of 100 years	23,033
7-2100 51 cm return period of 500 years	25,509
8-2100 70 cm return period of 500 years	33,961
9-2100 1 m return period of 100 years	39,842
10-2100 1 m return period of 500 years	42,318

In the most pessimistic scenario, the municipalities most severely affected in terms of number of inhabitants, in decreasing order, would be: **Erandio** (8,757), **Getxo** (7,729), **Irún** (6,995), **Donostia** (4,085), **Zumaia** (3,220), **Hondarribia** (2,850) **Bilbao** (2,270) and **Orio** (2,236).

Employees by sector:

The following sectors were analysed:

- Agriculture, livestock and fishing.
- Industry and energy.
- Construction.
- Services.

The most affected sector would be the service sector. The number of employees potentially affected in this sector would double by 2050 and could be 3 to 8 times higher by 2100, from about 4,000 employees potentially affected today to about 9,000 in 2050 and between 13,000 and 31,000 employees in 2100.

ESTIMATE OF THE NUMBER OF EMPLOYEES POTENTIALLY AFFECTED BY SECTOR OF ACTIVITY

CLIMATE SCENARIO	AGRICULTURE, LIVESTOCK AND FISHING	INDUSTRY AND ENERGY	CONSTRUCTION	SERVICES
1-Current return period of 100 years	44	1,891	777	3,944
2-Current return period of 500 years	44	2,030	809	4,260
3-2050 26 cm return period of 100 years	103	2,877	1,277	8,529
4-2050 26 cm return period of 500 years	115	3,272	1,338	9,239
5-2100 51 cm return period of 100 years	241	3,920	1,756	12,428
6-2100 70 cm return period of 100 years	311	6,140	2,142	14,780
7-2100 51 cm return period of 500 years	241	4,146	1,788	12,878
8-2100 70 cm return period of 500 years	327	6,308	2,453	21846
9-2100 1 m return period of 100 years	732	8,695	3,359	27,851
10-2100 1 m return period of 500 years	827	8,911	3,571	31,207

In the worst-case scenario, the municipality most affected in the agriculture, livestock and fishing sector would be **Hondarribia**, with an estimated 416 jobs threatened (which would represent 44% of the sector in this municipality), followed by **Ondarroa** and **Orio**, with 194 (19%) and 113 (56%) jobs, respectively. In the worst-case scenario, the municipality most affected in the manufacturing industry group within the industry and energy sector would be **Erandio** with 2,263 employees affected (47% of this municipality), followed by **Leioa and Zumaia**, with 1,757 and 1,404 employees, respectively (70% and 42% of the manufacturing industry). In the worst-case scenario, the municipality most affected in the construction sector would also be **Erandio** with 1,491 employees affected (37% of the sector in this municipality), followed by Bilbao and Irún, with 559 and 300 employees, respectively (3% and 8% of the sector in these municipalities, respectively). Finally, as far as the results on employment in the service sector is concerned, the possible effect of **Erandio** on other municipalities is particularly noteworthy.

Industrial (economic activities) and residential land:

Regarding the affected area of industrial and residential land. Residential land would be more affected than industrial land in overall terms. The surface area of residential land potentially affected in the Basque Country would range between 129 and 285 ha, depending on the climate scenario considered, while the amount of industrial land would range between 97 and 261 ha.

HECTARES OF RESIDENTIAL AND INDUSTRIAL LAND AREA (ECONOMIC ACTIVITIES) THAT COULD POTENTIALLY BE AFFECTED IN THE BASQUE COUNTRY

CLIMATE SCENARIO	RESIDENTIAL LAND	INDUSTRIAL LAND
1-Current return period of 100 years	71	54
2-Current return period of 500 years	76	60
3-2050 26 cm return period of 100 years	129	97
4-2050 26 cm return period of 500 years	136	104
5-2100 51 cm return period of 100 years	173	127
6-2100 70 cm return period of 100 years	180	133
7-2100 51 cm return period of 500 years	199	168
8-2100 70 cm return period of 500 years	230	184
9-2100 1 m return period of 100 years	274	248
10-2100 1 m return period of 500 years	285	261

Residential and industrial capital stock:

Results from the analysis by province show that the stock of residential capital would be affected in similar proportions in Bizkaia and Gipuzkoa. The residential capital stock in both provinces would be affected by about twice as much as in today's scenarios by 2050, and between two and almost five times as much by 2100.

As far as the industrial capital stock is concerned, this would be somewhat more affected in Bizkaia, with almost six times more losses in the worst-case scenario (Scenario 10) than in the current scenario (Scenario 2). By contrast, the loss in Gipuzkoa would be twice as high as in the current scenario.

POTENTIAL LOSSES OF RESIDENTIAL AND INDUSTRIAL CAPITAL STOCK IN BIZKAIA IN MILLIONS OF EUROS AND PERCENTAGE OF POTENTIALLY LOST VALUE

CLIMATE SCENARIO	RESIDENTIAL CAPITAL STOCK	INDUSTRIAL CAPITAL STOCK
1-Current return period of 100 years	214 (0.76%)	50 (1.00%)
2-Current return period of 500 years	233 (0.83%)	54 (1.08%)
3-2050 26 cm return period of 100 years	453 (1.61%)	104 (2.08%)
4-2050 26 cm return period of 500 years	487 (1.73%)	110 (2.20%)
5-2100 51 cm return period of 100 years	602 (2.14%)	138 (2.75%)
6-2100 70 cm return period of 100 years	688 (2.44%)	193 (3.85%)
7-2100 51 cm return period of 500 years	624 (2.22%)	146 (2.90%)
8-2100 70 cm return period of 500 years	810 (2.88%)	215 (4.29%)
9-2100 1 m return period of 100 years	955 (3.39%)	305 (6.07%)
10-2100 1 m return period of 500 years	976 (3.47%)	321 (6.39%)

POTENTIAL LOSSES OF RESIDENTIAL AND INDUSTRIAL CAPITAL STOCK IN GIPUZKOA IN MILLIONS OF EUROS AND PERCENTAGE OF POTENTIALLY LOST VALUE

CLIMATE SCENARIO	RESIDENTIAL CAPITAL STOCK	INDUSTRIAL CAPITAL STOCK
1-Current return period of 100 years	142 (0.63%)	37 (1.21%)
2-Current return period of 500 years	155 (0.69%)	43 (1.38%)
3-2050 26 cm return period of 100 years	311 (1.38%)	53 (1.72%)
4-2050 26 cm return period of 500 years	326 (1.45%)	57 (1.86%)
5-2100 51 cm return period of 100 years	442 (1.96%)	66 (2.16%)
6-2100 70 cm return period of 100 years	508 (2.26%)	78 (2.52%)
7-2100 51 cm return period of 500 years	462 (2.05%)	69 (2.24%)
8-2100 70 cm return period of 500 years	555 (2.46%)	81 (2.62%)
9-2100 1 m return period of 100 years	651 (2.89%)	95 (3.07%)
10-2100 1 m return period of 500 years	696 (3.09%)	99 (3.22%)

Industrial and services gross value added (GVA):

Industrial GVA would be most affected in Bizkaia, with losses in value of around 2% in 2050 and between almost 3% and 7.6% by 2100. In Gipuzkoa, losses in value would be around 1% in 2050 and would range between 1 and 2% in the scenarios considered for 2100. Industrial GVA would be affected in both provinces by about 1.5 times more than in today's scenarios by 2050. By contrast, GVA would be more affected in Bizkaia by 2100, with losses in value of between 3 and 6 times greater than those of the current scenarios.

The percentage of GVA potentially affected in the service sector activity groups considered would be affected in similar proportions in Bizkaia. In the worst-case climate scenario (Scenario 10), the GVA in Bizkaia would be potentially lost by a very similar loss in value of around 2.5% for any of the groups of activities considered. By contrast, the group of activities potentially most affected in Gipuzkoa would be “Trade, hotels and catering and transport”, followed by (Other services”, with losses of 5.19% and 4.23% respectively in the worst climate scenario. The “Other services “ activity group includes: information and communication; financial and insurance activities; property activities; professional scientific and technical activities; artistic, recreational and entertainment activities and other services.

POTENTIAL LOSSES IN INDUSTRIAL AND SERVICES GVA IN BIZKAIA IN MILLIONS OF EUROS AND PERCENTAGE OF POTENTIALLY LOST VALUE

CLIMATE SCENARIO	INDUSTRIAL GVA	SERVICES GVA CTH*	SERVICES GVA AAPP*	SERVICES GVA OTHERS*
1-Current return period of 100 years	68 (1.32%)	43 (0.74%)	31 (0.71%)	65 (0.70%)
2-Current return period of 500 years	72 (1.41%)	44 (0.75%)	32 (0.72%)	65 (0.70%)
3-2050 26 cm return period of 100 years	103 (2.01%)	57 (0.99%)	37 (0.83%)	87 (0.94%)
4-2050 26 cm return period of 500 years	109 (2.12%)	60 (1.03%)	38 (0.87%)	88 (0.95%)
5-2100 51 cm return period of 100 years	140 (2.73%)	73 (1.26%)	51 (1.15%)	105 (1.14%)
6-2100 70 cm return period of 100 years	217 (4.21%)	82 (1.42%)	61 (1.38%)	118 (1.28%)
7-2100 51 cm return period of 500 years	151 (2.94%)	75 (1.3%)	52 (1.17%)	108 (1.17%)
8-2100 70 cm return period of 500 years	242 (4.71%)	118 (2.04%)	91 (2.06%)	184 (1.99%)
9-2100 1 m return period of 100 years	368 (7.15%)	145 (2.5%)	107 (2.43%)	224 (2.42%)
10-2100 1 m return period of 500 years	390 (7.58%)	150 (2.59%)	110 (2.50%)	234 (2.53%)

*CTH: Trade, hotel and catering and transport; AAPP: Public administration, education, health and social services; OTHERS: Other services.

POTENTIAL LOSSES IN INDUSTRIAL AND SERVICES GVA IN GIPUZKOA IN MILLIONS OF EUROS AND PERCENTAGE OF POTENTIALLY LOST VALUE

CLIMATE SCENARIO	INDUSTRIAL GVA	SERVICES GVA CTH*	SERVICES GVA AAPP*	SERVICES GVA OTHERS*
1-Current return period of 100 years	28 (0.77%)	13 (0.49%)	43 (0.74%)	9 (0.26%)
2-Current return period of 500 years	32 (0.87%)	17 (0.65%)	44 (0.75%)	11 (0.30%)
3-2050 26 cm return period of 100 years	39 (1.06%)	52 (1.93%)	57 (0.99%)	56 (1.54%)
4-2050 26 cm return period of 500 years	42 (1.14%)	55 (2.06%)	60 (1.03%)	60 (1.62%)
5-2100 51 cm return period of 100 years	49 (1.33%)	78 (2.90%)	73 (1.26%)	88 (2.40%)
6-2100 70 cm return period of 100 years	58 (1.58%)	88 (3.28%)	82 (1.42%)	99 (2.70%)
7-2100 51 cm return period of 500 years	51 (1.38%)	80 (2.98%)	75 (1.3%)	93 (2.55%)
8-2100 70 cm return period of 500 years	61 (1.64%)	104 (3.88%)	118 (2.04%)	113 (3.09%)
9-2100 1 m return period of 100 years	71 (1.93%)	115 (4.31%)	145 (2.50%)	137 (3.73%)
10-2100 1 m return period of 500 years	76 (2.04%)	139 (5.19%)	150 (2.59%)	155 (4.23%)

*CTH: Trade, hotel and catering and transport; AAPP: Public administration, education, health and social services; OTHERS: Other services.

Critical subsystems:

The impact on essential critical subsystems was analysed (Law 8/2011 of April 28 on measures to protect critical infrastructures). The analysis considered high voltage pylons, reservoirs, antennas, sewage treatment plants, power and thermal power plants, hospitals, industrial facilities, major accident hazards, landfills and dumps, railway stations and lines, road and airport infrastructures.

According to the analysis, **Hondarribia airport** would be the only airport infrastructure at risk. Moreover, it would be affected by any of the scenarios outlined in the study.

In the case of **roads and railways**, the estimate for 2050 predicts that about 12-13 km of track would be flooded (in certain cases, with 100 and 500 year RPs). In 2100, the estimate is about 22 km in the best-case scenario, about 24 km in the intermediate scenario and about 57 km in the worst-case scenario.

It should be highlighted that Bilbao and Pasaia, the two ports of general interest which fall under the exclusive jurisdiction of the General State Administration, are outside the framework for action of this project.

Natural environment:

The geometric intersection of the flood spots was analysed, mapping the different indicators that characterise the exposure. Specifically, the indicators used focused on EUNIS habitats, and classifying habitats of community interest (HCI), endangered fauna and flora with approved management plans. Environmental vulnerability was characterised by the environmental figures applied in the area under study, areas presumed to be home to habitats and species of great interest to naturalists, as well as pristine and fragile environments. More specifically, the vulnerability indicators used focus on the protection figures for areas (Natura 2000 Network areas, autonomous protected areas, RAMSAR sites and biosphere reserves) and bodies of water defined in accordance with the Water Framework Directive (Directive 2000/60/EC).

The results of the environmental risk analysis in the worst-case scenario show that the **European mink (*Mustela lutreola*) and dwarf eelgrass (*Zostera noltii*)** would be the species with the greatest impact on their range and distribution in all the protected areas, **except in the protected nature areas in the autonomous communities** (protected biotopes and nature reserves). As far as habitats of community interest are concerned, **habitat types 1170 (reefs), 1130 (estuaries) and 1410 (Mediterranean salt marshes, *Juncetalia maritima*)** would be those most affected in terms of their range and distribution in all the areas analysed. Lastly, as far as EUNIS habitats are concerned, **X01 (estuaries), A2.636 (sea rushes, *Juncus maritimus*) and B (coastal habitats)** would have the greatest impact on their range and distribution in Natura 2000 Network sites, biosphere reserves, RAMSAR sites and transitional water bodies. By contrast, EUNIS habitats in natural spaces protected by regional legislation (in protected biotopes): **B3.23 (unvegetated coastal cliffs and rocks), A1.211 (*Pelvetia canaliculata* (fucoids) and barnacles on moderately exposed rocky shores), A1.11 (communities of mussels and/or barnacles), A3.13 (Mediterranean and Pontic communities of infralittoral algae very exposed to wave action) and A3.15 (frondose algal communities)**, would be the most affected.

Beach erosion and risk to tourism:

Considering the long and short term processes (i.e., waves, tides and sea level rise in the case being analysed here), the beaches that would suffer the greatest impact under average wave conditions, with the total or almost total loss of the dry beach by 2100, would be **Arrietara, Aizkorri, Muriola, Itzurun, Gaztetape, Isuntza, Karraspio and Zarautz**.

Looking only at the long-term processes (sea level rise), it is estimated that around 173,000 m² of beach could be lost by 2050, which represents 18%, and between 362,000 (37%) and 607,000 m² (62%) by 2100.

TOTAL SQUARE METRES OF DRY BEACH AREA THAT COULD POTENTIALLY BE LOST IN THE BASQUE COUNTRY

CLIMATE SCENARIO	BEACH SURFACE AREA
1 (+26cm, year 2050)	173,000
2 (+51cm, year 2100)	362,000
3 (+70cm, year 2100)	484,000
4 (+100cm, year 2100)	607,000

The beach that would eventually lose the most surface area in 2050, with an average sea level rise of 26 cm, would be **Zarautz**, with about 2 ha (31% of its current surface area), followed by the beaches of **Ereaga, Plentzia and Hondarribia**, with 1.8 ha, 1.75 ha and 1.3 ha, respectively (26%, 23% and 11% of their current surface area). The most affected beaches in the 2100 time horizon, with a rise of 100 cm, would be the same beaches: **Zarautz** with a loss of 5.7 ha (91% of its current surface area), **Ereaga** with 6.1 ha (89% of its current surface area), **Plentzia** with 5.7 ha (74% of its current surface area) and **Hondarribia** with 5.7 ha 48% of its current surface area). The beaches of **Aizkorri, Muriola, Isuntza, Itzurun and Gaztetape** have the highest percentage loss of beach area, with a 100% of eventual loss.

In the economic assessment of recreational use that could be lost, losses have been estimated at around 895 million euros by 2050 and between 1,885 and 3,201 million euros by 2100.

MILLIONS OF EUROS OF POTENTIAL LOSS OF RECREATIONAL USE IN THE BASQUE COUNTRY

CLIMATE SCENARIO	POTENTIAL LOSS OF RECREATIONAL USE
1 (+26cm, year 2050)	895
2 (+51cm, year 2100)	1,885
3 (+70cm, year 2100)	2,532
4 (+100cm, year 2100)	3,201

Morphological changes to estuaries

The impact of sea level rise (2050 and 2100) on the main estuaries along the Basque coast has been assessed: Nerbioi, Butroi, Oka and Artibai in Bizkaia, Deba, Urola, Urumea, Oiartzun and Bidasoa in Gipuzkoa. The combination of short watercourses and high rainfall basins creates a torrential hydrological regime, which, together with a significant tide (more than 4 m at high tides, mesotidal range), affects the main elements of Basque estuaries.

The results of the change indicators for the estuaries in the Basque Country generally show similar behaviour for almost all parameters. The Oka estuary would suffer the greatest rate of change (for both 2050 and, particularly, 2100) and the Oiartzun (Pasaia) and Deba ones would have a lesser impact.

Flooding and adapting in port areas and the surrounding terrain

In addition to playing an important socio-economic role, Basque ports also play an important role in protecting the surrounding urban areas, which have often developed around the port itself. From this point of view, almost all of the ports in the Basque Country can be considered sites located in coastal areas and in high density urban areas.

In addition to the fifteen port facilities under the jurisdiction of the Basque Country, including access and use facilities within the ports themselves, there are around 25 routes (roads, railway lines, stations and pedestrian and cycle paths) on land belonging to the Autonomous Community of the Basque Country.

To date, neither previous information on damage nor projections for 2050 justify considering measures to combat shoreline retreat for the time being. The increase in the current and predicted level of risk in 2050 in the urban areas surrounding the areas concerned, particularly the ports under the jurisdiction of the Basque Government, is not very noticeable, at least with the predicted +26 cm rise. Overall, the results indicate that protection and adaptation measures will be key to adapting to sea level rise in the areas concerned, by the 2050 time horizon. Targeted measures to raise the level of harbour embankments, the protection of buildings and the assessment of the stability of shelters will be effective until the middle of the 21st century.

The forecast for 2100 involves a much greater impact on inland estuary locations, some with port facilities, more so in Gipuzkoa (Zumaia and Orio) than in Bizkaia (Ondarroa and Plentzia with port areas and Erandio without them). In 2100, the objective should be to avoid increasing coastal vulnerability with elements in areas at risk and to monitor the evolution of the risk of existing elements in order to anticipate protective measures or, if necessary, timely withdrawal. Ocean and meteorological monitoring, event-based surveillance and an inventory of damage (type and volume) will improve assessment in the longer term (2100 time horizon).

Limitations:

It is worth mentioning that results are strongly contingent on the baseline information. For example, the approaches and assumptions made when working with socio-economic variables affect results and how they are interpreted. Besides, in almost all cases there is not enough data available to calibrate and validate the results. This is very important when it comes to socio-economic variables and other physical aspects, such as flood spots and beach erosion.

INTRODUCTION

KOSTAEGOKI is part of the Spanish Plan to Promote the Environment (PIMA Adapta Costas CCAA 2017) of the Ministry of Agriculture and Fisheries, Food and Environment (MAPAMA) aimed at the Autonomous Communities, to develop the National Climate Change Adaptation Plan (PNACC).

The PNACC is the framework for coordination between administrations for assessing impacts, vulnerability and adaptation to climate change in Spain. It was drawn up by the Spanish Office for Climate Change (OECC) and adopted by the Council of Ministers in 2006 and is aimed at integrating measures to adapt to climate change (CC)⁴.

MAPAMA's Strategy for Adapting the Spanish coast to climate change is based on assessing the vulnerability of the Spanish coasts. Under a Collaboration Agreement with the Environmental Hydraulics Institute of the University of Cantabria (IHCantabria), the OECC has developed scientific and technical tools to support developing policies and strategies for action on the Spanish coasts in response to climate change, structured in three areas⁵:

- Assessing changes in Spanish coastal dynamics over recent decades and analysing predictive data to estimate changes in coastal dynamics during the 21st century under various climate change scenarios.
- Assessing the effect of climate change on natural areas and human activities on the coast.
- Strategies to address climate change on the coast.

An application was developed for the Asturian coast as a pilot project of these methodologies. The result was C3E - Asturias: "Technical assistance in preparing a study on adapting to climate change on the coast of Asturias", an IHCantabria project for MAPAMA⁶.

⁴http://www.mapama.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/plan-nacional-adaptacion-cambio-climatico/planificacion_seguimiento.aspx

⁵<http://www.mapama.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/plan-nacional-adaptacion-cambio-climatico/impactos-en-la-costa-espanola-por-efecto-del-cambio-climatico/default.aspx>

⁶ <http://www.c3e-asturias.ihcantabria.com/>

The KOSTAEGOKI project addresses the implementation and adaptation of this methodological framework to the Basque Country.

UPDATE LOG

November 2022

Modifications to the cartographic viewer:

The display of the flood levels with respect to the Mean Sea Level in Alicante (MSL) has been added.

In the previous mapping, the flood levels were displayed referring to the hydrographic zero of the Port of Bilbao. To make it easier to use these heights, in this version the heights above mean sea level (MSL), commonly used in terrestrial cartography, are represented as a priority reference.

On the same mapping, it is possible to download the heights referring to the hydrographic zero of the Port of Bilbao (values are 2.06 m higher than MSL values).

January 2026

Modifications to the cartographic viewer:

New information on flood and coastal erosion risks due to sea level rise caused by climate change has been introduced.

Flooding:

- New return periods (RP): 5, 10, 25, 50 and 200 years, in addition to the previous ones (100 and 500 years).
- Calculation of flood layer thickness and population potentially affected by scenario.
- The analysis focuses on the most relevant social indicator: affected population.

Beach erosion:

- Enhanced visualisation: the geo-referenced position of the dry beach line is displayed for each scenario (RCP 4.5 and 8.5) and return period.
- Current and future dry beach areas and their rate of change are shown.

Modifications to the document:

The content has been adapted to improve understanding and several typos detected in the draft texts have been corrected in order to provide clearer and more accurate information.

On the other hand, beach erosion estimates have been updated. This version accounts for the rigid contours of beaches (i.e. the presence of walls, promenades and rocky areas). The previous version assumed that the average width of each beach was uniform. Consequently, the results in the section

"Beach erosion", the tables on erosion in the Annexes and the estimation of the risk to tourism due to potential beach loss (section "Risk to tourism due to beach erosion") have been updated. When the percentage of potential beach erosion is high (more than 75%), greater differences arise between the results published in the previous version of KOSTAEGOKI and those in the current update. The current approach, taking into account the shape of the rigid contour bordering the beach, is more accurate and appropriate for highly eroded areas.

For further information regarding modifications to the layers displayed in the viewer, please refer to the viewer documentation section <https://gis.ihobe.eus/kostaegoki/>

OBJECTIVES

The aim of KOSTAEGOKI is to provide relevant information and tools to the competent bodies relating to climate change on the Basque coast, to ensure that using them to plan and manage coastal areas helps tackle the challenges posed by this global phenomenon.

The following operational goals, grouped into phases, have been set to achieve this main aim:

- Detailed studies of the risks from climate change along the coast. Preparation of the data structure required to assess the "Vulnerability and Risk along the Basque Coast to prepare the 2050 Climate Change Adaptation Strategy".
- **Phase II.** A geographic information system to capture the conclusions of Phase I in a clear, synthetic and decision-oriented way.
- **Phase III.** Analysis of port infrastructures and land belonging to the Basque Country and adaptation measures.
- **Phase IV.** Guidelines for adapting to climate change by increasing the resilience of the coast as a whole for the rest of the impacted recipients.

This document summarises the key points of the study carried out in Phase I, the aim of which is to estimate the scale of climate change on the Basque coast by determining the risk to the socio-economic systems and the natural environment.

In the economic system, an attempt was made to estimate the likely consequences of the impacts of coastal flooding and erosion for different proposed scenarios.

As far as the natural system is concerned, the impact on coastal habitats and species due to flooding was analysed under the same proposed climate scenarios.

There is also a very brief description of the study carried out in Phase III.

ANALYSIS METHODOLOGY

The risk analysis follows the guidelines set out in the pilot study in Asturias by IHCantabria⁷, which stem from the report *Climate Change 2014: Impacts, Adaptation, and Vulnerability* (IPCC 2014a) prepared and published by the Intergovernmental Panel on Climate Change (IPCC).

Risk is defined as the likelihood of an event causing environmental damage, personal injury or economic loss (IPCC, 2014b; Cardona, 2004). Risks result from the interaction of hazards (e.g. sea level rise), exposure and vulnerability.

“Hazards” and “threats” describe climate events or trends that may cause loss of life, injury or other negative health effects, and damage and loss to property, infrastructures, livelihoods, services and environmental resources (IPCC 2014a). Threats can be expressed mathematically as the likelihood of an event of a certain intensity occurring at a particular location during a specific period of exposure (Cardona 2004). The hazard level for flooding has been formulated in terms of intensity associated with the flood level (thickness of the layer of water or depth) and likelihood, associated with return periods (RP) of 100 and 500 years.

Exposure and vulnerability are the main factors that define risk. Exposure refers to the presence of people, livelihoods, species or ecosystems, environmental services and resources, infrastructure, or economic, social or cultural assets in places that could be affected negatively. The existing assets on the Basque coast have been represented with the highest possible spatial resolution, located less than 5 km from the coastline, in order to define the exposure. Meanwhile, vulnerability refers to the consequences in the physical, social, economic and environmental contexts of regions, sectors or social groups that are likely to be affected. In the economic context, the vulnerability was obtained based on the economic value assigned to each type of land use, using a damage function.

The methodology used to analyse the potential consequences of two phenomena that occur due to the rise in mean sea level - coastal flooding and coastal erosion - and to assess morphological changes in estuaries is summarised below.

⁷ The full methodology is available in: MITERD “Collaboration agreement between the then Ministry of Agriculture, Food and Environment and the Autonomous Community of the Principality of Asturias on adapting to climate change on the coast of Asturias”. <https://www.miteco.gob.es/es/costas/temas/proteccion-costa/estrategia-adaptacion-cambio-climatico/default.aspx>

FLOOD RISK ASSESSMENT

Flood modelling

The flood elevation on the Basque coast was calculated as a preliminary step to preparing a flood map for flood modelling. The total height of water is called the flood elevation (FE) in this study and is determined through a combination of waves, astronomical and meteorological tides and mean sea level. Given that the importance of each dynamics varies according to the type of terrain over which the layer of water spreads, different formulations were applied to beaches, cliffs, sheltered structures and estuary mouths, following the proposals of Stockdon et al., 2006 and Ahrens, 1981.

The wave data for the coastal strip (at a depth of 20 m) come from the DOW data set (Camus et al. 2013), with a spatial resolution of 200 m. As certain areas along the coast require a higher degree of accuracy, the marine climate in port regions and bays (e.g. the Bilbao area and La Concha Bay) was re-propagated with the SWAM model, using a bathymetry with a 1 m resolution (Galparsoro et al. 2009). Meteorological tide data were obtained from the GOS 1.1 database (Cid, 2014). Astronomical tides were reconstructed using the harmonic constants of the Bilbao and Pasaia tide gauges. The flood levels associated with 5, 10, 25, 50, 100, 200 and 500 year RPs were obtained after adjusting the extreme regime using the generalised extreme value (GEV) method by means of annual maximums.

The projected rise in sea level over the 21st century was obtained from Slangen et al. 2014, with rises of +26 cm (mean value of the IPCC RCP4.5 and RCP8.5 scenarios for 2050), +51 cm and +70 cm (mean values of the IPCC RCP4.5 and RCP8.5 scenarios for 2100). A rise of +100 cm by 2100 was also considered as the worst-case and conservative scenario, as was done in the pilot study in Asturias.

Flood mapping was carried out using a geographic information system (GIS), a set of auxiliary programmes and the input data generated (digital elevation model - DEM, reference scenarios and future scenarios). The MDE was used, with a horizontal resolution of 1 m, generated from the Basque Government's 2016 topographic LIDAR,⁸ which shows the bare surface of the land with no buildings or structures.

The flood risk area was estimated using the following steps:

- **Step 1.** Defining the coastline based on the DEM using the extreme heights associated with the current MSL plus the contribution from the various processes analysed as the sea level (SL).

⁸ <ftp://ftp.geo.euskadi.eus/lidar/MDE LIDAR 2016 ETRS89/MDT/>

- **Step 2.** Defining the coastline for the SL in 2050 and 2100, by adding the SL rises of +26 cm for 2050 and +51 cm, +70 cm and +100 cm for 2100 to the SL in the previous step.
- **Step 3.** Estimating the area between the two coastlines defined in the previous steps. Areas connected to the coastline defined in the previous step are retained and areas that are not connected are removed (Webster et al. 2006).
- **Step 4.** Correcting the overestimation of the flood risk area using the tilted bathtub method (Perini et al., 2016) by calculating the distance to the coast.

Risk to the socio-economic system

Characterisation of exposure

The flood risk analysis was carried out for each of the scenarios defined with RP of 100 and 500 years, making it possible to determine the degree of impact on the different indicators that characterise exposure. The table below describes the indicators used and provides the source of the data that provide the baseline or current scenario. It also specifies the year to which the data used refer. Layers/levels of these indicators were produced for a 5 km strip from the coastline inland.

For the population indicator, future scenarios were defined and are described in the section “Flood risk scenarios for the socio-economic system”.

We considered high voltage pylons, reservoirs, antennas, sewage treatment plants, power and thermal power plants, hospitals, industrial facilities, major accident hazards, landfills and dumps, railway stations and lines, road and airport infrastructures to be critical subsystems (Law 8/2011 of April 28 on measures to protect critical infrastructure)⁹.

In order to characterise the exposure of critical infrastructures, they were classified in three groups based on the type of geographic information available:

- Polygon: Airports and heliports.
- Point: SEVESO industries, waste (companies with discharges into the air and/or water; storage of hazardous, non-hazardous, urban and inert waste), hospitals, electrical substations and WWTPs.
- Line: Main roads (motorways and dual carriageways) and railways (metro, trams, funicular railways).

⁹ Spanish Official Gazette BOE 102, 29/04/2011, <https://www.boe.es/buscar/act.php?id=BOE-A-2011-7630>

INDICATORS THAT CHARACTERISE EXPOSURE

INDICATOR	DESCRIPTION	SOURCE
City/Town	Number of individuals	Eustat (2016)
Employees by sector	Number of employees	Eustat (2018)
Residential land	Area occupied by residential land (ha)	UDALPLAN (2018)
Industrial land (economic activities)	Area occupied by industrial land – economic activities (ha)	
Residential capital stock	Economic value (€)	Estimate based on BBVA-IVIE data (2016)
Industrial capital stock	Economic value (€)	
Industrial GVA	Economic value (€)	Estimated from Eustat (2015)
Services GVA Trade, transport and hotel and catering	Economic value (€)	
Services GVA Public administration, health, education and social affairs	Economic value (€)	
Services GVA: other services	Economic value (€)	
Critical infrastructures	Identification of infrastructures	geoEuskadi URA (2018)

Calculation of consequences

Layers of information were intersected, more specifically those related to flooding, socio-economic exposure indicators and land use (residential and industrial) in certain cases.

Consequences for the population. The number of people potentially affected by flooding in the municipality as well as their percentage with respect to the total population were calculated.

Consequences for employment. The number of employees was estimated by sector, along with the average percentage of employees by sector affected in each municipality. The groups and/or sectors considered were as follows:

- Agriculture, livestock and fishing.
- Manufacturing industry within the industry and energy sector.
- Other activities carried out within the industry and energy sector.
- Construction.
- Trade, transport and hotel and catering within the service sector.
- Public administration, education, health and social services (within the service sector).
- Other service sector activities.

Consequences for industrial land (economic activities) and residential land. The industrial and residential area affected per municipality and the percentage it represents was calculated.

Consequences for capital stock and GVA. A damage function was applied when calculating economic losses (a curve giving the percentage loss of value based on the thickness of the layer of water under which it is flooded). The damage curve in the 2015-2016 Flood Risk Management Plan, prepared by the Basque Water Agency (URA, 2016), was used. The following variables were determined by province and scenario to estimate the consequences for the capital stock and GVA, following the methodology proposed by IHCantabria:

- Residential capital stock lost (€) and territorial percentage of loss.
- Industrial capital stock lost (€) and territorial percentage of loss.
- Industrial GVA lost (€) and percentage.
- Value of trade, hotel and catering and transport services GVA lost (€) and percentage.
- Value of public administration, education, health and social services GVA lost (€) and percentage.
- Value of other services GVA lost (€) and percentage.

Consequences for critical subsystems. Estimated variables are detailed below:

- Polygon: Airports and heliports. The infrastructure affected in the flood scenarios was identified and the thickness of the flood layer was represented.
- Point: SEVESO industries, waste (companies with discharges into the air and/or water; storage of hazardous, non-hazardous, urban and inert waste), hospitals, electrical substations and WWTPs. The number of specific infrastructures affected was estimated and their locations and names were identified.
- Line: Main roads (motorways and dual carriageways) and railways (metro, trams, funicular railways). The number of flooded stretches in each scenario and their length were recorded. Stretches of more than 200 m that could potentially be affected by flooding in each scenario were also identified.

Limitations:

The results of the impact of flooding are very dependent on the baseline information. The approaches and assumptions made when working with socio-economic indicators affect results and how they are interpreted. In addition, there is not much data available to calibrate and validate the results. This is very important when it comes to socio-economic variables and other physical aspects, such as flood spots.

As regards population, the data obtained are for buildings with more than 3 individuals, leaving all those buildings where there are less than 3 residents out of the study (in terms of overall results on the Basque coast, this effect is practically zero, although in some sparsely populated municipalities it could have a certain impact, albeit a very moderate one). It was not possible to measure the effect of the summer holiday population either, as this information is not available. The projections for future population scenarios for 2061 and 2100 were assumed to be the same.

The socio-economic indicators used are limited in terms of GVA, the damage function, and estimated levels of people, among others. Some of the considerations are listed below:

- GVA: the values were obtained indirectly through the GDP.
- The surface area occupied by companies in the service sector is unknown, so estimates were limited to the specific location affected.
- Data on the levels (flow of people) were not available, so it was not possible to estimate the number of people affected in critical infrastructures.
- Damage function: no ad-hoc calculations were made. The function proposed by URA (2016) for river flooding was adopted instead. This opens up a wide range of technical possibilities to study other more specific functions for coastal flood damage.

As far as critical infrastructures are concerned, it should be noted that it does not include the height of the infrastructure, which means that underground or tall structures (e.g. viaducts) may appear to be flooded, but they may not necessarily be affected more than just the pile foundations (e.g. in the case of viaducts).

Risk to the natural system

As in the risk analysis for the socio-economic system, the risk to the natural system follows the guidelines set out for the pilot project carried out in Asturias, which stem from the report *Climate Change 2014: Impacts, Adaptation, and Vulnerability* (IPPC 2014a).

It should be noted that the response of species to CC was not estimated in this study. Each species will respond in a specific way depending on its capacity to adapt to change (some are likely to disappear, while others may become more widespread). The project is focused on estimating the species and habitats affected and as a first step to mitigate CC by applying corrective measures where possible. Strategies for adapting to these changes in the natural environment were outside the scope of the project.

The geometric intersection of the flood spots was analysed methodologically, mapping the indicators that characterise the exposure. More specifically, the indicators used were the EUNIS habitat

classification, the classification of habitats of Community interest (HCIs), and endangered flora and fauna with approved management plans. The information on these indicators came from geoEuskadi (accessed on 24/11/2020).

Environmental vulnerability was characterised by the environmental figures implemented, the areas presumed to be habitats for species of great interest to naturalists, as well as pristine and fragile environments. More specifically, the vulnerability indicators used focus on the protection figures for areas (Natura 2000 Network areas, autonomous protected areas, RAMSAR sites and biosphere reserves) and bodies of water defined by the Water Framework Directive (Directive 2000/60/EC).

Protected biotopes, natural parks and listed trees are protected natural spaces at a regional level. The Basque natural areas currently protected by some kind of regulation include: four biotopes, seven listed trees, two natural parks, nineteen special conservation areas (SAC), three special protection areas for birds (SPA), two RAMSAR sites and one Biosphere Reserve. However, several of these protected areas have more than one protection status (e.g. the Gaztelugatxe biotope or the Urdaibai Reserve), which means that the total number of protected areas is considerably less. In terms of the coastal area, there are 14 protected areas in total.

The information on water bodies also comes from geoEuskadi (“Delimitación de las aguas superficiales de la CAPV” - Demarcation of surface waters in the Basque Country, accessed on 07/07/2020). At present, the water bodies in the study area are: four coastal water bodies, thirteen transitional water bodies and thirty-seven river water bodies, with artificial water bodies and reservoirs falling outside the study area.

The environmental risk assessment consisted of determining the habitats and species potentially affected by flooding. This was done by estimating the total area of their habitat potentially affected by flooding, the number of species (fauna and flora) affected by flooding in the study area, and each of the protected areas and bodies of water potentially affected, characterising the spatial distribution of the impacts generated by the flooding.

EROSION RISK ASSESSMENT

Erosion modelling

The most significant marine processes that alter the coastline are waves (defined by height, period and direction) and the variation in sea level (mean sea level rise, astronomical and meteorological tides). The wave data for the coastal strip (at -20 m) come from the DOW data set (Camus , 2013), with a spatial resolution of 200 m. Certain areas require a higher degree of accuracy, so the marine climate was re-propagated for instance around the Abra in Bilbao and in La Concha Bay with the

SWAM model, using bathymetry with a 1 m resolution in plan view (Galparsoro et al. 2009). Meteorological tide data were obtained from the GOS 1.1 database (Cid, 2014). Astronomical tides were reconstructed using the harmonic constants of Bilbao and Pasaia.

The sea level rise along the Basque coast during the 21st century was obtained from the regional projections made by Slangen et al. 2014, with two scenarios and their respective confidence intervals giving a total of six possible scenarios; on the one hand, a medium impact scenario (RCP 4.5) with a sea level rise by the end of the century ranging from +29 to +72 cm, and, on the other, a higher impact scenario (RCP 8.5) with a sea level rise ranging from +42 cm to +1 m by the end of the 21st century.

Given that studies carried out to date in the North Atlantic region predict minimal changes in wave height, peak period, wave direction and meteorological tide (Camus et al. 2017 and 2019), in this work they were assumed to remain constant with no trends whatsoever in the 21st century.

The coastline evolution model used takes both short- and long-term processes into account; it models the transportation of sediment along the coast due to variations in sea levels due to waves, astronomical tides, meteorological tides and sea level rise, as well as the influence of estuaries. A detailed description of the model used can be found in the article published by de Santiago et al. 2021. The model was calibrated and validated on the beaches of Zarautz, Ondarreta and La Concha in Donostia-San Sebastian. Zarautz beach was chosen as the main test site due to the amount of data available.

Average shoreline retreat was calculated for short term (wave) and long term (mean sea level rise) processes. It should be noted that the results only focused on the beach erosion process without taking accretion processes into account. The quantiles associated with return periods of 5, 10, 25, 50, 100 and 200 years for dry beach retreat were also calculated, after adjusting the signal obtained from the minimum annual erosion values to a GEV function by means of the maximum likelihood method. In addition, the corresponding erosion percentage was calculated for each beach, obtained by dividing the retreat associated with each return period by the current total average area of the beach.

Beach retreat due solely to sea level rise (+26, +51, +70 and +100 cm) was also estimated and the erosion index was calculated relating the retreat value to the current total average area of each beach. On the other hand, the volume of sediment lost was deduced using a variant of the formula proposed by IHCantabria (Hinkel et al., 2013) that takes into account the longitudinal variability of the beach:

$$V = h \int_a^b R(x) dx$$

where a and b are the side boundaries of the beach, $R(x)$ is the retreat due to mean sea level rise and h is the active height of the profile. The latter is calculated as the sum of the depth of closure, the height of the berm and the tidal range.

Lastly, the shoreline retreat and degree of impact were estimated by taking both short- and long-term processes jointly into account. The extreme tidal regime was estimated for the shoreline retreat on the beaches along the Basque coastline. The generalised extreme value (GEV) was adjusted to obtain the extreme tidal regime. For each proposed scenario, the RP retreat was calculated for 5, 10, 25, 50, 100 and 200 years. The erosion associated with these return periods, caused by the current wave effect, was added to the erosion caused by sea level rise in the selected climate scenarios.

It should be noted that the mapping display has been modified for each of the sandy areas considered. There has been a shift from providing a dry beach retreat value (in metres) to drawing the geo-referenced position of the dry beach line in the scenarios described earlier in this section.

Morphological changes to estuaries

The equilibrium models used to analyse the impacts of climate change on the morphological elements of estuaries are described below. These types of models are based on empirical relationships between the different morphodynamic elements of the estuary and the tidal prism (volume of water entering the estuary from low tide to high tide and leaving the estuary between high tide and low tide), and they provide general information on the equilibrium areas and volumes of the different morphological elements of estuaries.

It is assumed that the only natural way to alter the equilibrium morphology of an estuary (critical area of the estuary mouth, outer shallows, main channel, secondary channels and the inner flats or shallows) is by changing the tidal prism (Ω). This parameter can be affected by two factors: the change in mean sea level ($\Delta\eta$) due to climate change and/or the increase in the height of the inner shallows (α).

The variation of a tidal prism at any given time in its simplest form is:

$$\Delta\Omega = (\Delta\eta - \alpha)A_f$$

where $\Delta\Omega$ is the increase in tidal prism (m^3), $\Delta\eta$ the increase in sea level (m), α the increase in height of the inner shallows (m) and A_f the area occupied by the inner shallows (m^2).

Effect of the increase of the tidal prism on the inner shallows

If the rise in the height of the inner shallows is less than the rise in sea level ($\alpha < \Delta\eta$), the inner shallows will have a volume deficit compared to the initial equilibrium situation which will be equal to the $\Delta\Omega$ experienced. Consequently, we have:

$$V_f = V_{f,eq} + \Delta V_f; \Delta V_f = (\Delta\eta - \alpha)A_f$$

where V_f is the volume of sediment in the inner shallows (m^3), $V_{f,eq}$ is the equilibrium volume of the inner shallows (m^3) and ΔV_f is the deficit in volume of the inner shallows due to $\Delta\Omega$ (m^3).

The inner shallows will begin to regain their dynamic equilibrium when the rate of rise in their height exceeds the rate of sea level rise, and the time it will take to restore dynamic equilibrium will be given by the following exponential function (Agudo, 2013):

$$V_f = V_{f,eq}(1 - e^{-\alpha_r t}); \alpha_r = \alpha - \Delta\eta > 0$$

Effect of the increase of the tidal prism on the section of estuary mouth

The relationship between the variation in the area of the critical section of the estuary mouth and sea level rise is given by:

$$\frac{\Delta A_{eq}}{A_{eq,act}} = \frac{(\Delta\eta - \alpha)A_f}{\Omega_{act}}$$

where ΔA_{eq} is the variation in the equilibrium area of the mouth of the estuary (m^2).

Effect of the increase of the tidal prism on the outer shallows

The relationship between the variation in the volume of sediment in the outer shallows and sea level rise is given by:

$$\frac{\Delta V_{eq}}{V_{eq,act}} = \left(1 + \frac{(\Delta\eta - \alpha)A_f}{\Omega_{act}}\right)^c - 1$$

where ΔV_{eq} is the change in the volume of the outer shallows (m^3) and c is the coefficient of proportionality.

Effect of the increase of the tidal prism on the volume of the tidal channels

The relationship between the variation in the volume of sediment in the outer shallows and sea level rise is given by:

$$\frac{\Delta V_{MLWeq}}{V_{MLWeq,act}} = \left(1 + \frac{(\Delta\eta - \alpha)A_f}{\Omega_{act}}\right)^E - 1$$

where ΔV_{MLWeq} is the change in the volume of the tidal channels (m^3) and E is the coefficient of proportionality.

Morphological characterisation and coefficients of proportionality

The process of characterising the main morphological elements of the estuary is described below:

- The tidal prism (Ω) was estimated from available bathymetry as the volume contained between the heights of mean low tide/mean high tide in relation to mean sea level.
- The critical cross-sectional area (A_c) was obtained by considering the mean sea level and the existing bathymetry at the mouth of each estuary.
- The volume of the outer shallows (V).
- The volume of the tidal channels V_{MLW} was determined using the existing bathymetry relative to the low tide level of a 4 m high tidal range.
- The area of the bay (A_b) was determined based on maximum tidal penetration.
- The area occupied by the inner shallows (A_f) was estimated as the area of the bay above the low tide level of a 4-metre high tidal range.
- The volume occupied by the inner shallows (V_f) is the volume of sediment above the low tide level of a 4-metre high tidal range.

To estimate the effects on the morphological elements of the estuaries under study, it is assumed that:

- Sea level rise is the only disturbance ($\Delta\eta$).
- The area of the bay is considered to remain constant with $\Delta\eta$ due to the morphological configuration of the estuaries.
- It is assumed that estuaries start from an initial state close to dynamic equilibrium.

Risk to tourism

The risk of beach erosion to tourism was estimated using the methodology applied in the pilot project in Asturias (Toimil et al. 2018). The consequences of the risk of erosion in terms of loss of recreational value per m^2 on the beaches studied was assessed. In brief, the methodological steps include:

- Evaluation of the space used by beach users.
- Evaluation of the number of hours per year of recreational service, taking the length of the bathing season, the working day and an estimate of the actual usage rate into account.
- Estimation of the value of recreational use per square metre of beach.
- Economic and accounting valuation of the loss of dry beach, considering the location, quality and length of the beach.
- The area lost in each scenario considered is multiplied by the book value per m^2 to calculate the risk for each beach.

Limitations:

The same is true for beach erosion as for the flood risk assessment; the results are highly dependent on the baseline information, the approaches and the assumptions adopted. As far as the estimation of the risk to tourism is concerned, the limitations described in the reference documents of IHCantabria and in Toimil et al. 2018 can be referred to. The following limitations are highlighted:

- In terms of topography and bathymetry, there is no good intertidal information for some areas. There are no dates for the cartographic surveys to determine the profile of the beaches (summer or winter), which is important when it comes to knowing the area of dry beach.
- On some beaches, there is a lack of sedimentary characterisation or morphological elements for the beaches. Fortunately, in Zarautz video-monitoring systems have been available for years and these have provided good data for validating beach behaviour models.

SCENARIOS CONSIDERED

FLOODING SCENARIOS

Climate scenarios

The time horizons are now, 2050 (medium-term changes), and 2100 (long-term consequences). Ten scenarios were defined based on these time horizons, combining extreme wave events with return periods (RP) of 100 and 500 years and different mean sea level rises. All of them are mean values of the IPCC RCP4.5 and RCP8.5 scenarios for the Basque coast, modified locally using Slangen et al. except for a mean sea level rise of +100 cm, used as the worst-case scenario.

The ten climate scenarios analysed are listed and described in brief below:

- **Scenario 1. T1 - Current climate.** Extreme flood event scenario with a 100-year RP and current climate.
- **Scenario 2. T2 - Current climate.** Extreme flood event scenario with a 500-year RP and current climate.
- **Scenario 3. SLR1 + T1 - Time horizon of 2050.** Combines the extreme event with a 100-year RP and sea level rise of +26 cm (SLR 2050 RCP 4.5 and 8.5).
- **Scenario 4. SLR1 + T2 - Time horizon of 2050.** Combines the extreme event with a 500-year RP and sea level rise of +26 cm (SLR 2050 RCP 4.5 and 8.5).
- **Scenario 5. SLR2 + T1 - Time horizon of 2100.** Scenario with an extreme event with an RP of 100 years and sea level rise of +51 cm (SLR 2100 RCP 4.5).
- **Scenario 6. SLR3 + T1 - Time horizon of 2100.** Scenario with a 100-year RP and sea level rise of +70 cm (SLR 2100 RCP 8.5).
- **Scenario 7. SLR2 + T2 - Time horizon of 2100.** RP of 500 years and sea level rise of +51 cm (SLR 2100 RCP 4.5).
- **Scenario 8. SLR3 + T2 - Time horizon of 2100.** RP of 500 years and sea level rise of +70 cm (SLR 2100 RCP 8.5).
- **Scenario 9. SLR4 + T1 - Time horizon of 2100.** Worst-case scenario which combines the extreme event with a 100-year RP and a sea level rise of +100 cm.
- **Scenario 10. SLR4 + T2 - Time horizon of 2100.** Worst-case scenario which combines the extreme event with a 500-year RP and a sea level rise of +100 cm.

Flood risk scenarios for the socio-economic system

The scenarios used to determine the flood risk on the socio-economic system were obtained by crossing the climate scenarios with socio-economic scenarios (which only considered changes in the population), and three time horizons: current, 2050 and 2100.

The socio-economic scenarios used the following approaches in relation to the time projections:

- It was assumed that population growth predicted in EUSTAT 2018 for 2100 will be similar to that of 2061.
- It was also assumed that the spatial distribution of the population will be the same as it is today (both in 2050 and 2100).
- It was assumed that the future values of economic indicators, capital stock and GVA would be the same as the current values.
- It was also assumed that the number of employees by economic sector in 2050 and 2100 will be the same as today.

The spatial distribution of the population is constant over time. However, three demographic scenarios (based on EUSTAT 2018 predictions) were considered to assess the number of people affected:

- Demographic Scenario 1: the population does not change.
- Demographic Scenario 2: the population increases: 10.68% by 2050 and 11.60% by 2100.
- Demographic Scenario 3: The population drops: 12.94% by 2050 and 19.81% by 2100.

Flood risk scenarios for the natural system

The ten climate scenarios described above were considered in the flood risk analysis of the natural system. No changes were considered in the exposure and vulnerability of the natural system.

BEACH EROSION SCENARIOS

Climate scenarios

Two scenarios and their respective confidence intervals were analysed giving six possible scenarios; on the one hand, a medium impact scenario (RCP 4.5) with a sea level rise by the end of the century ranging from +29 to +72 cm, and, on the other, a higher impact scenario (RCP 8.5) with a sea level rise ranging from +42 cm to almost +100 cm by the end of the 21st century (Slangen et al. 2014).

Erosion risk scenarios

The scenarios considered in the erosion risk assessment are described below:

- **Scenario SLR1.** This scenario considers a mean sea level rise of +26 cm by the 2050 time horizon and corresponds to the IPCC RCP8.5 medium scenario.
- **Scenario SLR2.** This scenario considers a mean sea level rise of +51 cm by the 2100 time horizon and corresponds to the IPCC RCP4.5 medium scenario.
- **Scenario SLR3.** This scenario considers a mean sea level rise of 70 cm by 2100 and corresponds to the IPCC RCP8.5 medium scenario.
- **Scenario SLR4.** This scenario considers a mean sea level rise of +100 cm by 2050 time horizon and corresponds to the IPCC RCP8.5 maximum scenario.

It should be noted that the RCP4.5 scenario was also analysed for 2050 with a rise of +26 cm. However, it was not finally considered as a scenario, as the results were very similar to, and more optimistic than, RCP8.5 for the same time horizon year and mean sea level rise.

The erosion risk scenarios only considered climate change, as in Asturias. The socio-economic scenario was assumed to be constant, i.e., it was decided to leave the wage structure of society, the preferences of users and the complementary services unchanged.

RESULTS

The geo-referenced results obtained by KOSTAEGOKI can be found on the web viewer <https://gis.ihobe.eus/kostaegoki> and, partially, on the geoEuskadi website showing the Spatial Data Infrastructure of the Basque Country (<https://www.geo.euskadi.eus>).

Overall, the expected level of impact on the different compartments analysed (population, areas at risk of flooding, economic values, beaches, infrastructure and the natural environment) is expected to be moderate in 2050, while in 2100 it will worsen significantly, to a greater or lesser extent, depending on the emissions scenario and, therefore, the sea level rise that takes place.

FLOODING

The images below show images of areas flooded in some of the scenarios and the details of certain locations as an illustrative example of the information made available.

FLOODING IN THE BILBAO ESTUARY IN SCENARIO 2 (LEFT IMAGE), SCENARIO 7 (CENTRE IMAGE) AND SCENARIO 10 (RIGHT IMAGE).



FLOODING IN ZUMAIA IN SCENARIO 2 (LEFT IMAGE), SCENARIO 7 (CENTRE IMAGE) AND SCENARIO 10 (RIGHT IMAGE).



FLOODING IN HONDARRIBIA AND IRÚN IN SCENARIO 2 (LEFT IMAGE), SCENARIO 7 (MIDDLE IMAGE) AND SCENARIO 10 (RIGHT IMAGE).



The table below shows the total area affected in each scenario and the percentage in relation to the total area of the Basque Country (7,234 km²). 0.27% of the area of the community would be affected in Scenario 3, with a mean sea level rise of +26 cm and return period of 100 years. The affected land area in Scenario 10, the worst-case scenario, would be 0.38%.

SURFACE AREA POTENTIALLY AFFECTED (HA) AND PERCENTAGE IN RELATION TO THE TOTAL OF THE BASQUE COUNTRY

CLIMATE SCENARIO	FLOODED LAND AREA	PERCENTAGE
1-Current return period of 100 years	1,676	0.23
2-Current return period of 500 years	1,734	0.24
3-2050 26 cm return period of 100 years	1,929	0.27
4-2050 26 cm return period of 500 years	1,972	0.27
5-2100 51 cm return period of 100 years	2,135	0.30
6-2100 70 cm return period of 100 years	2,179	0.30
7-2100 51 cm return period of 500 years	2,301	0.32
8-2100 70 cm return period of 500 years	2,386	0.33
9-2100 1 m return period of 100 years	2,659	0.37
10-2100 1 m return period of 500 years	2,718	0.38

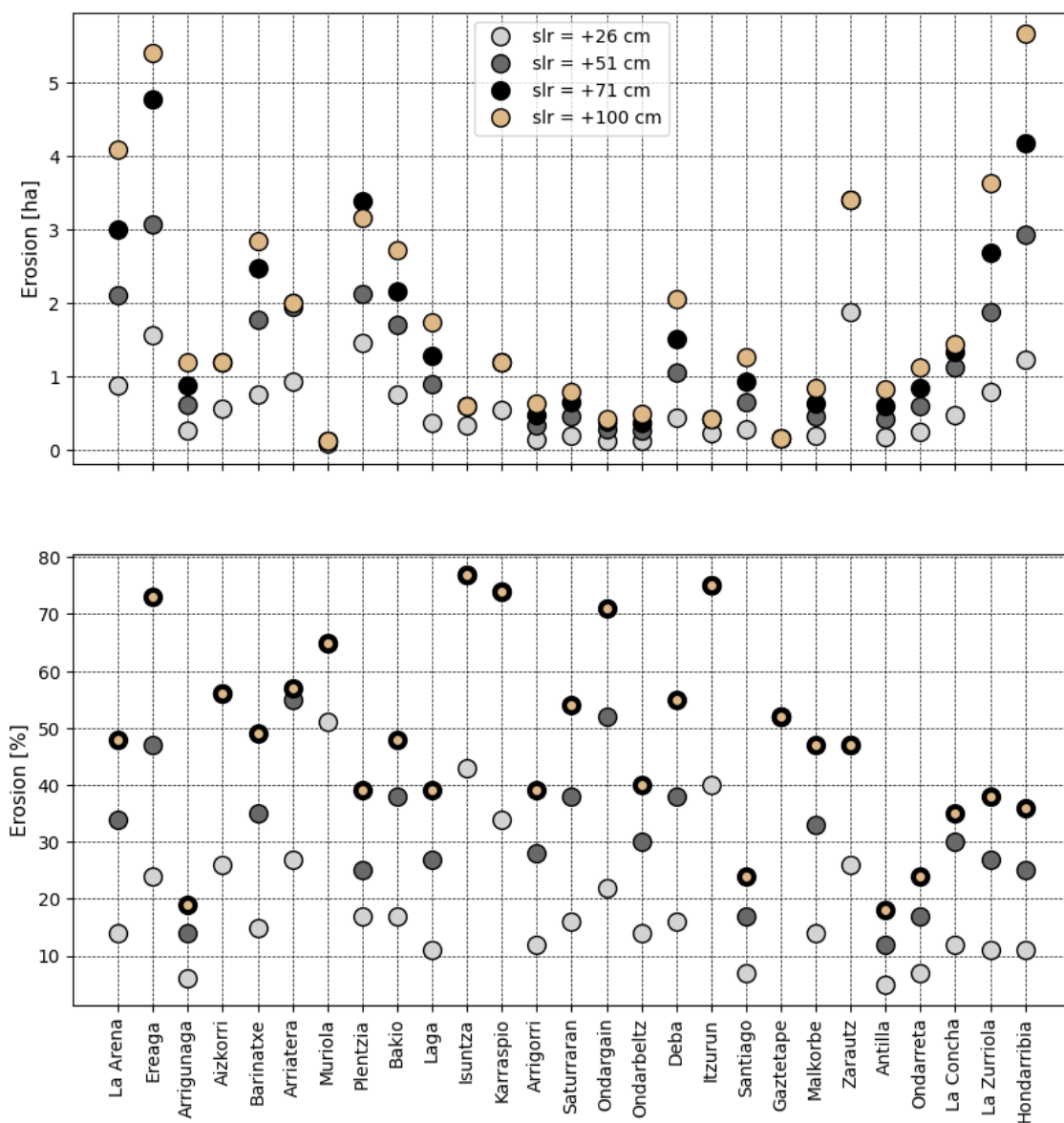
The annexes include tables showing the results of the area potentially flooded by municipality (hectares potentially affected and municipal percentage).

The municipalities most impacted would be Hondarribia and Gauteviz-Arteaga with slightly more than 210 ha affected in Scenario 10, the worst-case scenario (a sea level rise of +100 cm combined with a 500-year RP). The least impacted municipalities would be Amoroto, Ajangiz, Loiu and Zestoa with less than 1 hectare affected under the same scenario (Scenario 10).

BEACH EROSION

The mean shoreline retreat and the degree of impact taking into account sea level rise scenarios are depicted in the figures below.

POTENTIALLY ERODED BEACH AREA (ABOVE) AND ITS CORRESPONDING POTENTIAL EROSION RATE (BELOW) UNDER SEA LEVEL RISE (SLR) CLIMATE SCENARIOS



The area of beach potentially lost and its percentage in each of the erosion scenarios is listed in tables in the Annexes. Up to 15 ha of beach could be lost by 2050, which represents 16% of the current surface area, and between 32 ha (32%) and 50 ha (51%) by 2100.

The beach that would lose the most surface area in 2050, with an average sea level rise of +26 cm, would be Zarautz, with about 19,000 m² (26% of its current surface area), followed by the beaches of Ereaga, Plentzia y Hondarribia, with 16,000 m², 15,000 m² and 12,000 m², respectively (24%, 17% and 11% of their current surface area, respectively). The most affected beaches in 2100, with a rise of +100 cm, would be the same beaches: Zarautz, with a potential loss of 90% of the surface area in the seawall area (but not in the dune area); Ereaga and Hondarribia with losses of approximately 55.000 m² (83% and 49% of its current surface area, respectively); La Arena with 41,000 m² (66% of its current surface area); followed by La Zurriola and Plentzia with around 30,000 m² (52% and 37% of their current surface area, respectively).

In short, the following parameters were also calculated (for more information, see the section on methodology):

- Mean potential retreat of the shoreline.
- Potential retreat in extreme conditions: combining sea level and waves for return periods of 5, 10, 25 50, 100 and 200 years.
- Percentage of potentially eroded area.
- Volume of sand potentially lost.

MORPHOLOGICAL CHANGES TO ESTUARIES

The changes derived from the rise in mean sea level in the morphological characteristics of the main estuaries of the Basque coast have been analysed: Nerbioi, Butroi, Oka, Artibai, Deba, Urola, Urumea, Oiartzun and Bidasoa for 2050 and 2100. Equilibrium models specifically adapted to Basque estuaries were applied, following the methodology of the pilot study in Asturias¹⁰, analysing the evolution of the estuary mouths, the outer shallows, the channels and the inner shallows.

The rivers that flow into these estuaries are short in length and have a steep gradient. The rainfall in the area (with annual rainfall, which increases from west to east and can reach 2500 mm) and the high run-off coefficient result in an almost torrential hydrological regime (López, 1986; García de Bikuña and Docampo, 1990).

¹⁰ https://www.miteco.gob.es/es/costas/temas/proteccion-costas/informe_final_act_1_asturias_tcm30-163199.pdf

The astronomical tide on the Basque coast is semi-diurnal (2 high tides and 2 low tides per day) and has a slight daily asymmetry in amplitude. The tidal range goes from 1 m at neap tides to more than 4.5 m at high tides. Basque estuaries are mesotidal in this sense, although they have characteristics of macrotidal estuaries (González et al., 2004).

Given these general considerations, the river flow and tide are the two main determining factors of the dynamic and hydrographic characteristics of the estuaries on the Basque coast.

The equilibrium models used to analyse the estuaries are based on empirical relationships between morphological elements of the estuary¹¹ (estuary mouth, volume of the inner shallows, outer shallows and material in the inner tidal channels) and the tidal prism (volume of water entering the estuary as the tide rises and leaving as the tide falls). Although these models provide an overview of the different morphological elements of the estuaries, they are unable to describe the evolution over time of each element and their spatial distribution.

The mapping by Valencia et al., 2004, that reviewed the available topography and bathymetry, was used. It should also be noted that practically all of the estuaries in the Basque Country are heavily affected by dredging, channelling work, ports, etc., so the results obtained need to be interpreted with a certain amount of caution.

Change indicators for the estuaries in the Basque Country generally show similar behaviour. The Oka estuary would suffer the greatest rate of change (in the scenarios for both 2050 and, particularly, 2100) and the Oiartzun (Pasaia) estuary would experience the least impact. The same assumptions that were used in the Asturias pilot study were used to estimate these indicators. The table below shows the effects for each estuary.

ESTIMATE OF THE MORPHOLOGICAL EFFECTS ON BASQUE ESTUARIES IN 2050 AND 2100. PERCENTAGES OF CHANGE

	Deficit in the volume of the inner shallows		Increase in the critical section of the estuary mouth		Increase in the volume of the outer shallows		Increase in the volume of the tidal channels	
	2050	2100	2050	2100	2050	2100	2050	2100
Nerbioi	9	34	2	7	4	14	3	11
Butroi	11	40	8	30	16	65	13	50
Oka	7	26	13	49	27	1.18	21	88
Artibai	9	34	4	15	8	32	6	25
Deba	8	29	7	27	15	59	12	46

¹¹ <http://www.revistaaquatic.com/ojs/index.php/aquatic/article/view/122/111>

Urola	13	48	3	13	7	27	6	21
Urumea	9	34	3	12	6	25	5	20
Oiartzun	10	36	1	3	2	6	1	5
Bidasoa	9	35	1	5	3	10	2	8

The expected effects in Oka and Oiartzun are described by way of example for 2050 and 2100:

- It is estimated that the inland shallows could have a deficit of sediment compared to the equilibrium, but will gradually recover by increasing the level of sediment. The increase needed to reach equilibrium would be: (1) 7% and 26% for the 2050 and 2100 time horizons respectively for Oka, and (2) 10% and 36% for Oiartzun.
- The critical section of the estuary mouth would tend to increase until a new equilibrium state is reached. The increase needed to reach equilibrium would be: (1) 13% and 49% for the 2050 and 2100 time horizons respectively for Oka, and (2) 1% and 3% for Oiartzun.
- A deficit in volume would be created in the outer shallows, which will tend to be offset in order to re-establish the dynamic equilibrium. The increase needed to reach equilibrium would be: (1) 27% and 118% for 2050 and 2100 respectively for Oka, and (2) 2% and 6% for Oiartzun.
- The volume would tend to increase in the tidal channels until a new dynamic equilibrium is reached. The estimated increase to reach the new equilibrium situation: (1) it would be 21% and 88% for the 2050 and 2100 time horizons respectively for Oka, and (2) 1% and 5% for Oiartzun.

RISK TO THE SOCIO-ECONOMIC SYSTEM

City/Town

It should be noted that these results would in all cases be for situations where the likelihood that they will occur is very low, with return periods of 100 and 500 years (values in line with the severity of the damage that would be caused by affecting homes), if no adaptation measures are taken in relation to installations, shoreline retreat and defence works, and that what they show is an increase in the level of risk for this variable (population eventually affected) as a result of rising sea levels.

The annexes show the results for the population that could potentially be affected in each municipality in the three selected demographic scenarios: Demographic Scenario 1, where the population remains constant; Demographic Scenario 2, where the population increases; and Demographic Scenario 3, where the population decreases.

The population that could potentially be affected in the climate scenarios considered, assuming that the population remains constant in 2050 and 2100, is summarised in the table below.

NUMBER OF PEOPLE POTENTIALLY AFFECTED IN THE BASQUE COUNTRY. DEMOGRAPHIC SCENARIO 1. UNCHANGED POPULATION

CLIMATE SCENARIO	POPULATION AFFECTED (NO. OF PEOPLE)
1-Current return period of 100 years	7,847
2-Current return period of 500 years	8,515
3-2050 26 cm return period of 100 years	15,008
4-2050 26 cm return period of 500 years	15,697
5-2100 51 cm return period of 100 years	21,932
6-2100 70 cm return period of 100 years	23,033
7-2100 51 cm return period of 500 years	25,509
8-2100 70 cm return period of 500 years	33,961
9-2100 1 m return period of 100 years	39,842
10-2100 1 m return period of 500 years	42,318

Demographic Scenario 1: Unchanged population

As far as the results for the current climate are concerned, both for the scenario representing the return period (RP) of 100 years and that of 500 years (Scenario 1 and Scenario 2), Erandio would be the most affected municipality, followed by Hondarribia and Irún. In the 100-year RP (Scenario 1), 5,434 people could be affected in Erandio, 1,070 people in Hondarribia and 899 people in Irún.

The most affected municipalities in the 2050 would also be Erandio, Hondarribia and Irún. For example, in the scenario of a rise of +26 cm and a return period of 100 years (Scenario 3), 6,782 people in Erandio, 3,738 people in Irún and 1,315 people in Hondarribia would be affected.

For 2100, in the scenario with a mean sea level rise of +51 cm and a 100-year RP (Scenario 5), Erandio, Irún and Donostia would be the most potentially affected municipalities in terms of the number of inhabitants, with 7,803, 5,225 and 1,918 inhabitants affected, respectively.

In 2100, with a rise of +70 cm and a 500-year RP (Scenario 8), Erandio, Getxo, Irún and Donostia would be the most potentially affected municipalities. Erandio would have 8,373 inhabitants affected, Getxo 6,381, Irún 6,256 and Donostia 3,257.

In the worst-case scenario for the 2100 time horizon, with a sea level rise of 1 m and a 500-year RP (Scenario 10), the municipalities most affected in terms of the number of inhabitants at risk of being affected, in decreasing order, would be: Erandio (8,757), Getxo (7,729), Irún (6,995), Donostia (4,085), Zumaia (3,220), Bilbao (2,270) and Orio (2,238).

Demographic Scenario 2: The population increases (10.68% by 2050 and 11.60% by 2100)

In the 2050 time horizon, as in Demographic Scenario 1, the municipalities most affected would be Erandio, Irún and Hondarribia. In the scenario with a mean sea level rise of 26 cm, about 7,506 people would be affected in Erandio for the 100-year RP (Scenario 3), 4,137 people in Irún and nearly 1,500 people in Hondarribia.

In the 2100 time horizon with an average sea level rise of 70 cm and a 500-year RP (Scenario 8), Erandio, Getxo, Irún and Donostia would be the municipalities most affected, the same as in Demographic Scenario 1. However, this time the population that could potentially be affected is larger; Erandio (9,344), Getxo (7,121), Irún (6,981) and San Sebastian (3,634).

In the worst-case scenario for the 2100 time horizon, with a sea level rise of +100 cm and a 500-year RP (Scenario 10), the municipalities most affected in terms of number of inhabitants, in decreasing order, as in Demographic Scenario 1, would be: Erandio (9,772 people), Getxo (8,625), Irún (7,806), Donostia (4,558), Zumaia (3,593), Bilbao (2,533) y Orio (2,497).

Demographic Scenario 3: The population decreases (12.94% by 2050 and 19.81% by 2100)

In 2050, as in Demographic Scenarios 1 and 2, the municipalities most affected would be Erandio, Irún and Hondarribia. In the scenario with a mean sea level rise of +26 cm, 5,904 people would be affected in Erandio for the return period of 100 years (Scenario 3), 3,254 people in Irún and 1,144 people in Hondarribia.

In the 2100 time horizon with an average sea level rise of 70 cm and a 500-year RP (Scenario 8), Erandio, Getxo, Irún and Donostia would be the municipalities with the populations most affected, the same as in Demographic Scenarios 1 and 2. However, the population affected this time would be less; Erandio (6,714 inhabitants affected), Getxo (5,116), Irún (5,016) and Donostia (2,611).

In the worst-case scenario for 2100, with a sea level rise of +100 cm and an RP of 500 years (Scenario 10), the municipalities most affected would be: Erandio, Getxo, Irún, Donostia, Zumaia, Bilbao and Orío, although with a smaller number of people affected than in scenarios 1 and 2 due to the decrease in population foreseen in this demographic scenario.

Percentage of population affected by municipality

The Annexes include the percentage of people affected in each municipality in the area under study, under all of the demographic and climate scenarios considered. The percentages affected are the same in all of the demographic scenarios considered, as it is assumed that the change in population is homogeneous throughout the region. Even if the population affected increases or decreases, the percentage does not change.

In all scenarios, Erandio and Ea would be the municipalities with the highest percentage of population affected. With the current climate, in the case of the scenario with an RP of 100 years (Scenario 1), 24% and 22% of the population of Erandio and Ea would be affected, respectively.

In 2050, in the scenario with a +26 cm rise in mean sea level and a 100-year RP (Scenario 3), 30% and 23.4% of the population of Erandio and Ea would be affected, respectively. Orío also stands out in this scenario, where 18% of the population would be potentially affected.

As far as the results for the 2100 time horizon are concerned, in the scenario with a +51 cm rise in mean sea level and a 100-year RP (Scenario 5), the municipalities with the highest percentages of impact would be, in descending order: Erandio (34%), Orío (26%), Ea (24%) and Zumaia (14%). With a 100-year RP, but with an average sea level rise of +70 cm (Scenario 6), the population affected would increase to 37% in Erandio, 32% in Orío, 19% in Zumaia and 13% in Busturia.

In the worst-case scenario for the 2100 time horizon, the most affected municipalities in decreasing order would be: Erandio (39%), Zumaia (34%), Ea (27%), Hondarribia (18%), Busturia (16%) and Deba (12%).

Employees by sector

Exact information on the number of employees is not available and the available data show different categories by number of employees. Each category has a minimum and a maximum number of employees, so the average value of each range has been used in the analysis.

It should be borne in mind that all future scenarios assume that the location of the current activity, company or facility does not change and that the same comment about the low frequency of these flood events (RPs of 100 and 500 years) applies as the one mentioned above for population.

An estimate of the average number of potentially affected employees in each sector is shown for each municipality. Moreover, an estimate of the percentage of potentially affected employees in each sector is given for each municipality for the worst-case scenario in terms of sea level rise and return periods (Scenario 10) for 2100 - +100 cm and 500-year RP.

Detailed results can be found in the annexes for each sector and scenario at a municipal level.

Agriculture, livestock and fishing sector

In the worst-case scenario, Scenario 10, the municipality most affected in this sector would be **Hondarribia**, with approximately 416 employees affected (which would represent 44% of the sector in this municipality), followed by **Ondarroa and Orio**, with 194 (19%) and 113 (57%) employees, respectively.

Industry and energy sector

Manufacturing industry group

In Scenario 10, the most affected municipality in this group would be Erandio with 2,263 employees affected (47%), followed by Leioa (1,757, 70%) and Zumaia (1,404, 42%). Percentage-wise, the municipality of Murueta would have a 100% risk of being affected in this worst-case scenario. In Hondarribia and Ondarroa, half of the employees in the manufacturing industry would be potentially affected due to the flooding of their workplaces.

Other activities

These activities include: the extractive industry; electricity, gas, steam and air conditioning supply activities; and water supply, sanitation, waste management and decontamination activities. In the most pessimistic scenario, the municipality most affected would be Erandio (606 jobs, 91%), followed by Sestao (375 jobs, 98%).

Construction sector

In the most pessimistic scenario (Scenario 10), the municipality most affected in this sector would also be Erandio (1,491 jobs affected; 37%), followed by Bilbao (559,3%) and Irún (300,8%). Percentage-wise, Orio and Zumaia would see an impact of half and a third of their jobs in this sector respectively, in this worst-case scenario.

Service sector

Trade, hotel and catering and transport

In the worst-case scenario, Erandio would be the municipality where these activities would be most affected, with 2,535 employees affected (46.98% of this group of activities). It would be followed by Irún with 1,627 (7%), Getxo with 1,552 (13%), Hondarribia with 1,380 (34%) and San Sebastian with 1,268 jobs possibly affected (2.4%). However, Ea, Orío and Zumaia would be more affected percentage-wise, with values over 50% (57% in the case of Ea).

Public administration, education, health and social services

In Scenario 10, the municipality where most people engaged in these activities could be affected would be Erandio with 2,498 (31%), followed by Getxo with 2,437 (17%), Bilbao with 2,180 (2%) and Irún with 1,268 (14%). Other municipalities where the percentage values of those affected are significant are: Ea, Orío, Zumaia and Plentzia, where the percentages of incidence at a municipal level range between 30% and 62%.

Other activities

Other service sector activities include: information and communication; financial and insurance activities; property activities; professional scientific and technical activities; artistic, recreational and entertainment activities and other services. The municipality most affected in this sector would be Getxo with 1,230 employees affected (8.7%), followed by Erandio with 1,150 (23%) and Donostia with 860 (1.4%). Percentage-wise, the municipalities with the highest impact factor in this pessimistic scenario are Ea (67%) and Zumaia (55%).

Residential and industrial land (economic activities)

The table below shows the hectares of residential and industrial land that could potentially be affected by the rise in mean sea level.

HECTARES OF RESIDENTIAL AND INDUSTRIAL LAND AREA (ECONOMIC ACTIVITIES) THAT COULD POTENTIALLY BE AFFECTED IN THE BASQUE COUNTRY

CLIMATE SCENARIO	RESIDENTIAL LAND	INDUSTRIAL LAND
1-Current return period of 100 years	71	54
2-Current return period of 500 years	76	60
3-2050 26 cm return period of 100 years	129	97
4-2050 26 cm return period of 500 years	136	104
5-2100 51 cm return period of 100 years	173	127
6-2100 70 cm return period of 100 years	180	133
7-2100 51 cm return period of 500 years	199	168
8-2100 70 cm return period of 500 years	230	184
9-2100 1 m return period of 100 years	274	248
10-2100 1 m return period of 500 years	285	261

The tables in the Annexes section show the results of the residential and industrial land area that could potentially be affected by municipality. In the case of residential land, the municipality with greatest area affected in Scenario 10 would be Bilbao. Approximately 62 ha of residential area (5.6%) would be affected (the possible effect under the low-probability conditions analysed, with a 500-year RP). It would be followed, in order of area, by Donostia (1.9%), Getxo (3.8%), Hondarribia (23.5%), Plentzia (7.3%) and Erandio (14%), with a residential land area of around 20 - 26 ha affected in all of them. Percentage-wise, Orio is particularly noteworthy in the worst-case scenario, with a third of its total residential land area potentially affected, the highest value in the entire series of data.

As far as industrial land in Scenario 10 is concerned, the municipality with the greatest potential land area lost would be Erandio, where 54 ha of industrial land area would be affected (27% at risk). It is followed by Valle de Trápaga with around 38 ha of land area lost (24%) and, with a loss of industrial land area of about 27 ha, by Leioa (21%), Barakaldo (14%) and Sestao (26%). Percentage-wise, the municipality of Murueta is particularly noteworthy in this worst-case scenario, with almost 85% of its industrial land area at risk.

Residential and industrial capital stock

The potential loss of residential and industrial capital stock is shown for each province, both in millions of euros and as a percentage value. In the case of the residential capital stock in Bizkaia, between 453 and 976 million euros could be adversely affected depending on the climate scenario; these amounts represent a 1.6% and 3.5% loss in value respectively. By contrast, in Gipuzkoa, the stock of residential capital would be negatively affected by between 3.11 (1.4%) and 6.96 (3.1%) billion euros, depending on the scenario.

**POTENTIAL LOSSES OF RESIDENTIAL AND INDUSTRIAL CAPITAL STOCK IN BIZKAIA IN
MILLIONS OF EUROS AND PERCENTAGE OF POTENTIALLY LOST VALUE**

CLIMATE SCENARIO	RESIDENTIAL CAPITAL STOCK	INDUSTRIAL CAPITAL STOCK
1-Current return period of 100 years	214 (0.76%)	50 (1.00%)
2-Current return period of 500 years	233 (0.83%)	54 (1.08%)
3-2050 26 cm return period of 100 years	453 (1.61%)	104 (2.08%)
4-2050 26 cm return period of 500 years	487 (1.73%)	110 (2.20%)
5-2100 51 cm return period of 100 years	602 (2.14%)	138 (2.75%)
6-2100 70 cm return period of 100 years	688 (2.44%)	193 (3.85%)
7-2100 51 cm return period of 500 years	624 (2.22%)	146 (2.90%)
8-2100 70 cm return period of 500 years	810 (2.88%)	215 (4.29%)
9-2100 1 m return period of 100 years	955 (3.39%)	305 (6.07%)
10-2100 1 m return period of 500 years	976 (3.47%)	321 (6.39%)

In the case of the industrial capital stock in Bizkaia, between 104 and 321 million euros would be at risk, representing a 2.1% and 6.4% loss in value respectively. The industrial capital stock potentially affected in Gipuzkoa would range between 53 and 99 million euros depending on the scenario, representing a 1.7% and 3.2% loss in value respectively.

**POTENTIAL LOSSES OF RESIDENTIAL AND INDUSTRIAL CAPITAL STOCK IN GIPUZKOA
IN MILLIONS OF EUROS AND PERCENTAGE OF POTENTIALLY LOST VALUE**

CLIMATE SCENARIO	RESIDENTIAL CAPITAL STOCK	INDUSTRIAL CAPITAL STOCK
1-Current return period of 100 years	142 (0.63%)	37 (1.21%)
2-Current return period of 500 years	155 (0.69%)	43 (1.38%)
3-2050 26 cm return period of 100 years	311 (1.38%)	53 (1.72%)
4-2050 26 cm return period of 500 years	326 (1.45%)	57 (1.86%)
5-2100 51 cm return period of 100 years	442 (1.96%)	66 (2.16%)
6-2100 70 cm return period of 100 years	508 (2.26%)	78 (2.52%)
7-2100 51 cm return period of 500 years	462 (2.05%)	69 (2.24%)
8-2100 70 cm return period of 500 years	555 (2.46%)	81 (2.62%)
9-2100 1 m return period of 100 years	651 (2.89%)	95 (3.07%)
10-2100 1 m return period of 500 years	696 (3.09%)	99 (3.22%)

Industrial and services GVA

Industrial GVA would be most affected in Bizkaia, with losses in value of around 2% in 2050 and between almost 3% and 8% by 2050 (103 to 109 million euros) and between almost 3% and 8% by the year 2100 (140 to 390 million euros). In Gipuzkoa, losses in value would be around 1% in 2050 (between 39 and 42 million euros of losses) and would range between 1% and 2% in the scenarios considered for 2100 (between 49 and 76 million euros of losses).

The percentage of GVA in the service sector activity groups considered would be affected in similar proportions in Bizkaia. In the worst-case climate scenario (Scenario 10), the GVA in Bizkaia would be potentially affected by a very similar loss in value of around 2.5% for any of the groups of activities considered.

By contrast, the group of activities potentially most affected in Gipuzkoa would be “Trade, hotels and catering and transport”, followed by (Other services”, with losses of 5.19% and 4.23% respectively in the worst climate scenario. The “Other services “ activity group includes: information and communication; financial and insurance activities; property activities; professional scientific and technical activities; artistic, recreational and entertainment activities and other services.

POTENTIAL LOSSES IN INDUSTRIAL AND SERVICES GVA IN BIZKAIA IN MILLIONS OF EUROS AND PERCENTAGE OF POTENTIALLY LOST VALUE

CLIMATE SCENARIO	INDUSTRIAL GVA	SERVICES GVA CTH*	SERVICES GVA AAPP*	SERVICES GVA OTHERS*
1-Current return period of 100 years	68 (1.32%)	43 (0.74%)	31 (0.71%)	65 (0.70%)
2-Current return period of 500 years	72 (1.41%)	44 (0.75%)	32 (0.72%)	65 (0.70%)
3-2050 26 cm return period of 100 years	103 (2.01%)	57 (0.99%)	37 (0.83%)	87 (0.94%)
4-2050 26 cm return period of 500 years	109 (2.12%)	60 (1.03%)	38 (0.87%)	88 (0.95%)
5-2100 51 cm return period of 100 years	140 (2.73%)	73 (1.26%)	51 (1.15%)	105 (1.14%)
6-2100 70 cm return period of 100 years	217 (4.21%)	82 (1.42%)	61 (1.38%)	118 (1.28%)
7-2100 51 cm return period of 500 years	151 (2.94%)	75 (1.3%)	52 (1.17%)	108 (1.17%)
8-2100 70 cm return period of 500 years	242 (4.71%)	118 (2.04%)	91 (2.06%)	184 (1.99%)
9-2100 1 m return period of 100 years	368 (7.15%)	145 (2.5%)	107 (2.43%)	224 (2.42%)
10-2100 1 m return period of 500 years	390 (7.58%)	150 (2.59%)	110 (2.50%)	234 (2.53%)

*CTH: Trade, hotel and catering and transport; AAPP: Public administration, education, health and social services; OTHERS: Other services.

POTENTIAL LOSSES IN INDUSTRIAL AND SERVICES GVA IN GIPUZKOA IN MILLIONS OF EUROS AND PERCENTAGE OF POTENTIALLY LOST VALUE

CLIMATE SCENARIO	INDUSTRIAL GVA	SERVICES GVA CTH*	SERVICES GVA AAPP*	SERVICES GVA OTHERS*
1-Current return period of 100 years	28 (0.77%)	13 (0.49%)	43 (0.74%)	9 (0.26%)
2-Current return period of 500 years	32 (0.87%)	17 (0.65%)	44 (0.75%)	11 (0.30%)
3-2050 26 cm return period of 100 years	39 (1.06%)	52 (1.93%)	57 (0.99%)	56 (1.54%)
4-2050 26 cm return period of 500 years	42 (1.14%)	55 (2.06%)	60 (1.03%)	60 (1.62%)
5-2100 51 cm return period of 100 years	49 (1.33%)	78 (2.90%)	73 (1.26%)	88 (2.40%)
6-2100 70 cm return period of 100 years	58 (1.58%)	88 (3.28%)	82 (1.42%)	99 (2.70%)
7-2100 51 cm return period of 500 years	51 (1.38%)	80 (2.98%)	75 (1.3%)	93 (2.55%)
8-2100 70 cm return period of 500 years	61 (1.64%)	104 (3.88%)	118 (2.04%)	113 (3.09%)
9-2100 1 m return period of 100 years	71 (1.93%)	115 (4.31%)	145 (2.50%)	137 (3.73%)
10-2100 1 m return period of 500 years	76 (2.04%)	139 (5.19%)	150 (2.59%)	155 (4.23%)

*CTH: Trade, hotel and catering and transport; AAPP: Public administration, education, health and social services; OTHERS: Other services.

IDENTIFICATION OF CRITICAL SUBSYSTEMS THAT COULD POTENTIALLY BE AFFECTED

In the case of airport and heliport infrastructures, the only critical subsystem at risk would be Hondarribia airport.

As regards point-type infrastructures - SEVESO industries, waste (companies with discharges into the air and/or water; storage of hazardous, non-hazardous, urban and inert waste), hospitals, electrical substations and WWTPs (point-type information) - the only critical subsystems that may be affected would be those relating to waste and WWTPs. The other point-type infrastructures would not be affected, even in Scenario 10. The annexes include a table which identifies all of these point-type infrastructures potentially affected by each scenario considered. It should be noted that it was not possible to estimate the surface area affected of the entities analysed, or the number of people potentially affected, as there is a lack of information on levels of people and surface areas. The table below represents the total number of potentially affected critical point-type subsystems.

NUMBER OF CRITICAL POINT-TYPE SUBSYSTEMS THAT COULD POTENTIALLY BE AFFECTED

CLIMATE SCENARIOS									
1	2	3	4	5	6	7	8	9	10
0	1	0	1	3	7	3	8	11	12

In the case of critical line-type subsystems at risk (motorways, dual carriageways, and railways, such as the metro, train, tramway, funicular), for which the layout of their axis is available, the tables included in the annexes can be consulted.

As there is a lack of information on levels of people and surface areas, it was not possible to estimate the surface area affected for each entity or the number of people affected, factors that would make it possible to categorise the impact of climate change on each of these subsystems in more detail.

The table below shows the total number of critical line-type subsystems that could potentially be affected by each climate scenario proposed. It should also be noted that the information used does not include the height of the infrastructure, which means that underground or tall structures (e.g. viaducts) may appear to be flooded, but only the pile foundations may be affected (e.g. in the case viaducts).

NUMBER OF CRITICAL LINE-TYPE SUBSYSTEMS (ROADWAYS, RAILWAY TRACKS, ETC.) AND SUM OF ALL THE LENGTHS OF POTENTIALLY AFFECTED STRETCHES OF TRACK OR ROAD

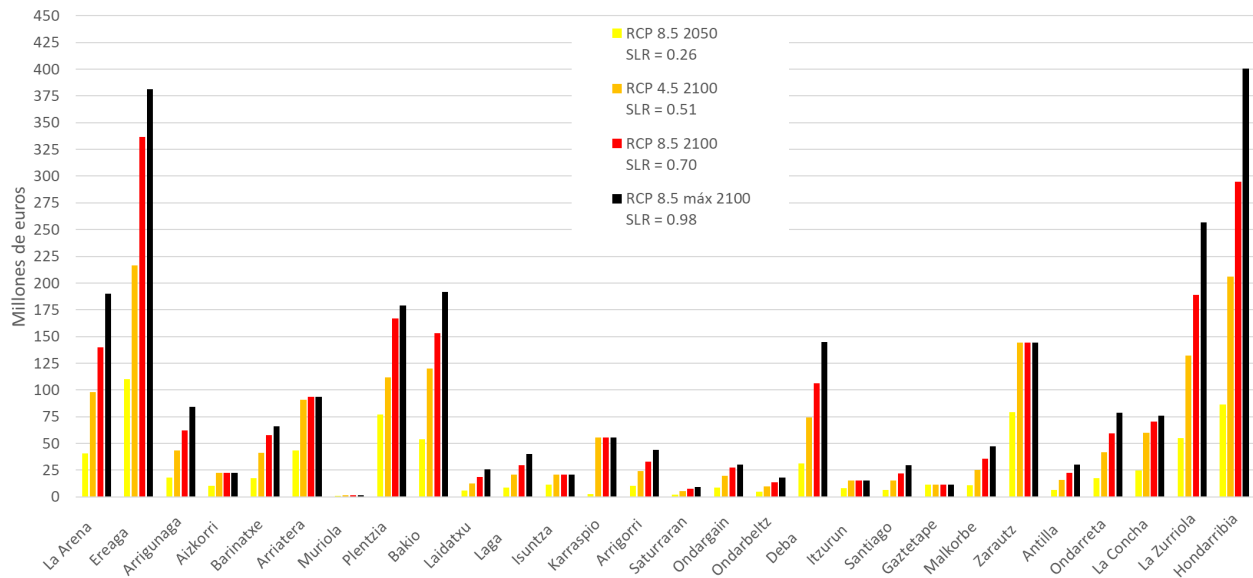
CLIMATE SCENARIOS	NUMBER OF FLOODED STRETCHES	TOTAL LENGTH OF ALL FLOODED STRETCHES IN METRES
1-Current return period of 100 years	54	8,465
2-Current return period of 500 years	60	8,904
3-2050 26 cm return period of 100 years	97	12,958
4-2050 26 cm return period of 500 years	104	13,932
5-2100 51 cm return period of 100 years	127	22,348
6-2100 70 cm return period of 100 years	133	30,200
7-2100 51 cm return period of 500 years	168	23,768
8-2100 70 cm return period of 500 years	184	37,716
9-2100 1 m return period of 100 years	248	53,167
10-2100 1 m return period of 500 years	261	56,694

RISK TO TOURISM DUE TO BEACH EROSION

The graph below shows the estimated economic value of the recreational use that could be lost for every beach and mean sea level rise scenario considered, in terms of area lost and book value assigned. Data updated in 2026 on the potential erosion area on beaches has been used to carry out this risk assessment.

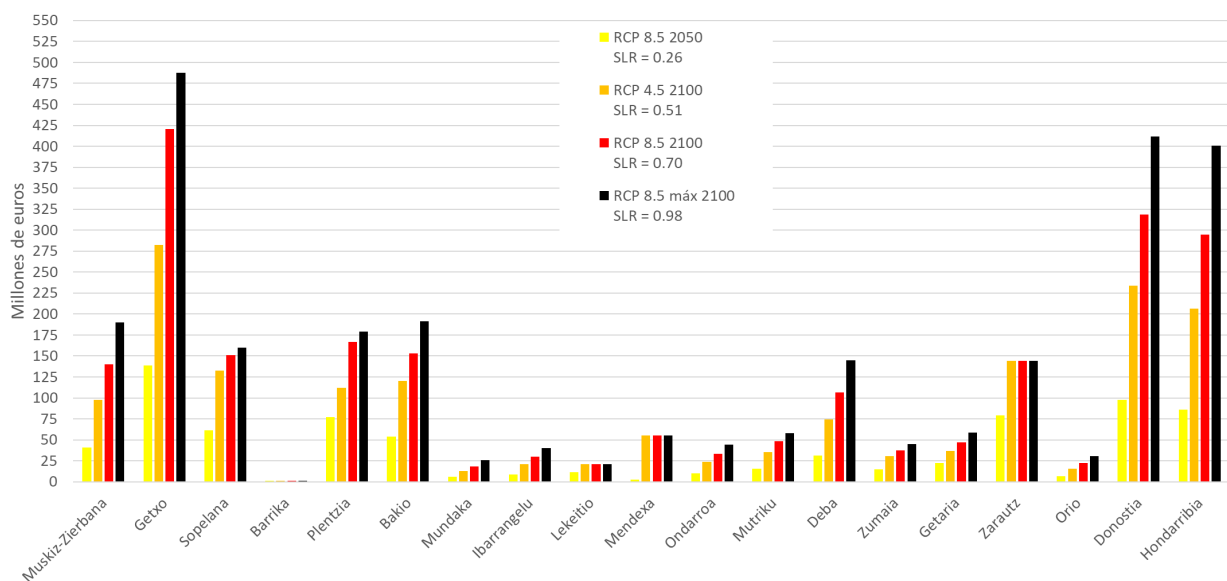
Given their characteristics and the area lost due to sea level rise, the beaches that would lose the most in terms of recreational use in the worst-case scenario (+100 cm sea level rise) would be Hondarribia (400 million) and Ereaga (381 million). In this same scenario, the next ones would be La Zurriola (257 million) and Bakio (191 million).

MILLIONS OF EUROS OF POTENTIAL LOSS OF RECREATIONAL USE OF BEACHES



The aggregated results by municipality are shown below. Getxo, which is home to the beaches of Ereaga, Arrigunaga and Aizkorri, would be the most affected municipality (488 million euros), followed by Donostia and Hondarribia (412 and 400 million euros, respectively).

MILLIONS OF EUROS OF POTENTIAL LOSS OF MUNICIPAL RECREATIONAL USE



Of the 38 official beaches on the Basque coastline, studies were carried out on 28 sandy beaches dominated by wave dynamics. The beaches that did not meet these characteristics and were left out of the analysis (10 of the 38 official beaches) were: Las Arenas beach (also in the municipality of Getxo), Gorniz beach, Armintza beach, Aritzatxu (in Bermeo), Toña and San Antonio (in Sukarrieta), Laida (in Ibarangelu), Ea beach, Ogeia beach (in Ispaster) and Mutriku-port beach.

RISK TO THE NATURAL SYSTEM

The tables and graphs below show the results of the possible impact on the different indicators used to characterise the environmental setting in each of the scenarios.

Fauna and flora

The annexes include the results of the estimation of the range and distribution of the potentially affected species of fauna and flora by protection category and body of water.

In the worst-case scenario, the European mink (*Mustela lutreola*) would be the species with the greatest impact on its range and distribution in all the areas considered, except in natural areas protected by regional legislation. The other species whose range and distribution would be affected would be: three-spined stickleback (*Gasterosteus aculeatus*), Mediterranean tree frog (*Hyla meridionalis*), European storm petrel (*Hydrobates pelagicus*) and European shag (*Phalacrocorax aristotelis*).

As far as flora are concerned in Scenario 10, dwarf eelgrass (*Zostera noltii*) is the species that would have the greatest impact on its range and distribution in all the protected areas considered, except in natural areas protected by regional legislation. There are a variety of species whose range and distribution would be affected, but to a lesser extent than dwarf eelgrass (*Zostera noltii*).

Habitats of Community Interest (HCI) and EUNIS habitats

The surface area of HCIs and EUNIS habitats at risk by protection category, body of water, and flood scenario, are shown in the Annexes. In the HCIs, habitat types 1170 (reefs), 1130 (estuaries) and 1410 (Mediterranean salt marshes, *Juncetalia maritima*) would be the most affected in the worst-case scenario, and to a lesser extent, habitat type 1420 (Mediterranean and thermo-Atlantic halophilous scrubs - *Sarcocornetea fruticosi*). There are a variety of species whose range and distribution would be potentially affected, but to a lesser extent.

In the worst-case scenario, EUNIS habitats X01 (estuaries), A2.636 (sea rushes, *Juncus maritimus*) and B (coastal habitats) have the greatest impact on Natura 2000 sites, biosphere reserves, RAMSAR sites and transitional water bodies. In natural areas protected by regional legislation, EUNIS habitats B3.23 (cliffs and coastal rocks without vegetation) and A1.211 (*Pelvetia canaliculata*

and barnacles on moderately exposed rocky shores) would be of particular note. The habitats potentially affected in coastal bodies of water would be: A1.11 (communities of mussels and/or barnacles), A3.13 (Mediterranean and Pontic communities of infralittoral algae very exposed to wave action) and A3.15 (frondose algal communities).

However, there are a wide variety of species whose range and distribution could possibly be affected, but to a lesser extent (see tables in the Annexes).

FLOODING AND ADAPTATION IN PORT AREAS

Areas susceptible to flooding due to a combination of astronomical tides, meteorological tides and surge waves for events that are unlikely to occur (return periods, RP, of 100 and 500 years) were analysed for the ten climate scenarios above:

The fifteen port areas under the jurisdiction of the Basque Government are: Plentzia, Armintza, Bermeo, Mundaka, Ea, Elantxobe, Lekeitio and Ondarroa (Bizkaia), Mutriku, Deba, Zumaia, Getaria, Orio, Donostia and Hondarribia (Gipuzkoa). The results for each port are summarised below:

- **Plentzia.** Plentzia, on the Butron estuary, is the westernmost port; it occupies 1 hectare of water and is integrated into the town. At current sea levels it is estimated that 0.2 ha would be prone to flooding. In 2050, the flood-prone area would be less than 0.3 ha. By 2100 the flood-prone areas would be 0.5 ha with a sea level rise of +51 cm, 1 ha with a sea level rise of +70 cm and 1.2 for +100 cm.
- **Armintza.** It is the port least affected by sea level rise. There is difference of about 2000 m² in extent between Scenario 1 (current sea level with a 100-year RP and flood-prone area of 2.8 ha) and Scenario 10 (+100 cm, a 500-year RP and flood-prone area of 3 ha).
- **Bermeo.** Bermeo is one of the towns where the most significant wave damage has occurred, especially in port civil engineering works. At the current level, about 4 ha of the harbour are at risk of flooding and by 2050, it would be around 4.5 ha. In 2100, a sea level rise of 51 cm, would lead to about 5 ha of flood-prone areas. A rise of 70 cm would see flood-prone areas of between 5.4 and 8.2 ha, and the worst-case scenario (+100 cm) would reach up to 12 ha. By 2100, virtually all quay sides and port buildings and facilities would be at risk.
- **Mundaka.** The fact that the port of Mundaka is small and protected from the waves means that a rise in sea level would not represent a significant increase in flood-prone areas. There is only an increase of about 2,000 m² between the best-case scenario (1 ha) and worst-case scenario (1.2 ha). The impact on the urban area of Mundaka would be small, even in with +100 cm rise.
- **Elantxobe.** It is similar to Mundaka in terms of size and is well sheltered from the waves, although to a lesser extent than Mundaka. This would increase from 1.4 ha in today's scenario

to just over 1.5 ha in the worst case scenario (+100 cm and RP=500 years). The fact that the urban area is on a steep slope means that it is largely unaffected by flooding.

- **Ea.** The smallest of the ports is in a very sheltered area, accessible only at high tide and with very little activity outside the summer season. The results indicate that almost the entire port area would be flood-prone today, which is not consistent with the lack of information on damage (e.g. in 2014). Results need to be analysed more closely in future work.
- **Lekeitio.** It is of medium size. Flood-prone areas are currently 2.8 ha, rising to 3 ha by 2050. Flood-prone areas would increase to almost 4 ha in the worst-case scenario (+100 cm sea level rise) by the end of the century and could affect urban areas near to port areas.
- **Ondarroa.** The sea level rise forecast for 2050 (+26 cm) would mean an increase in the flood-prone areas of about 2 ha (from about 7 ha currently to 9 ha). A rise by the end of the 21st century would mean an increase in flood-prone areas of between 3 ha (+51 cm) and 5 ha (+100 cm). By 2100, the increased risk would affect almost all parts of the harbour, even in the case of the lowest sea level rise of +51 cm.
- **Mutriku.** Currently, about 5 ha are at risk of flooding and 5.3 ha would be in 2050. By 2100, there could be about 5.5 to 6 ha of flood-prone areas under the +51 cm and +70 cm rise scenarios, and up to almost 7 ha under the +100 cm rise scenario. The inner part of the port is the most protected and only the quayside would be at risk even in 2100.
- **Deba.** In the current and 2050 scenarios, the port would show little change in terms of flood-prone areas, (<0.2 ha). If there was a very significant change in the level of risk by the end of the 21st century, in the three scenarios for 2100, the flood-prone areas would increase significantly by 1.2 to 1.7 ha and, in the event of rises of +70 cm or more, these flood-prone areas could extend into urban areas adjacent to the harbour.
- **Zumaia.** In the Urola estuary, sheltered from the waves. The level of risk for the urban areas on the west bank would increase significantly for both the projected mean sea level rise in 2050 (+26 cm) and for 2100 (+51, +70 and +100 cm). In the case of the port area, on the east bank, a significant increase in the level of risk is predicted for the end of the 21st century. In the current situation and in 2050 the southern embankment of the channel and part of the shipyard would be located in flood-prone areas. The same is true for the +51 and +70 cm scenarios for 2100, and in the worst case scenario (+100 cm), practically all port facilities would be located in areas susceptible to flooding.
- **Getaria.** It is one of the safest ports in the Bay of Biscay. Comparing the current situation to the situation of 2050 with a sea level rise of +26 cm, the increase in areas at risk of flooding in the port and in the surrounding areas is very moderate, but with +70 and +100 cm, there would be a significant increase in port areas at risk.

- **Orio.** The recreational inner harbour nearest the mouth of the estuary would not be significantly impacted, not even with +100 cm by 2100. However, the risk in the urban area nearest the shore and other areas of the estuary would increase significantly.
- **Donostia.** Small, relatively sheltered port. In the current scenarios, about 2 ha are at risk. In 2050 (+26 cm), this area will increase by about 0.3 ha and in 2100, with a rise of 100 cm, it would reach an area of 2.7 ha. The results show a high level of risk even today. However, these results must be taken with some caution, as there is no information on damage to support this result.
- **Hondarribia.** Hondarribia has three port infrastructures:
 - **The harbour/haven.** It is a very sheltered port and only the sea level rise of 100 cm in 2100 would lead to an appreciable increase in the areas at risk.
 - **Hondarribia marina.** It is located between the beach and the La Marina district of Hondarribia. Only 0.5 ha would be at risk in the current scenario (ramps and sections of the quayside). These areas would slightly increase to 0.7 ha in the 2050 horizon with a +26 cm rise in sea level. The projections for 2100 are worse - even with the more moderate rise of +51 cm a large part of the harbour esplanades would be at risk of flooding.
 - **The old dock.** This sports dock with 246 moorings is located between the runway of Hondarribia airport and the urban area. Like other port areas, the projected sea level rise in 2050 shows a relatively similar level of risk to the current climate. However, the level of impact would increase significantly by 2100, particularly with +70 and +100 cm rise.

Neither previous information on damage nor projections for 2050 justify considering measures to combat shoreline retreat for the time being. The increase in the current and predicted level of risk in 2050 in the urban areas surrounding the areas concerned, particularly the ports under the jurisdiction of the Basque Government, is not very noticeable, at least with the +26 cm rise in the average sea level.

Overall, the results indicate that protection and adaptation measures will be key to adapting to sea level rise in the areas concerned, particularly by the 2050 time horizon. Targeted measures to raise the level of harbour embankments, the protection of buildings in risk areas and the assessment of the stability of shelters will be effective until the middle of the 21st century.

The forecast for 2100 involves a much greater predicted impact on several inland estuary locations with port facilities, more so in Gipuzkoa (Zumaia and Orio in particular) than in Bizkaia (Ondarroa and Plentzia with port areas).

In the longer term, 2100, the objective should be to avoid increasing coastal vulnerability with elements in areas at risk and to monitor the evolution of the risk of existing elements in order to anticipate protective measures or, if necessary, timely withdrawal.

Ocean and meteorological monitoring, event-based surveillance and an inventory of type and volume of damage will improve risk assessment in the longer term.

CONCLUSIONS

The geographical area covered by the study encompasses some 130,000 ha of territory, 18% of the surface area of the Basque Country, and includes some 56,000 buildings inhabited by more than 1.3 million people (almost 60% of the Basque population).

The results show the flooding typical of a coastline dominated by cliffs, with estuaries and beaches being the most affected areas. In Scenario 10 (the worst-case scenario), the municipalities with the most flooded area (i.e. at risk of being flooded) would be Hondarribia and Gautegez-Arteaga (>210 ha), followed by Murueta (~150 ha). However, in percentage terms and in terms of the municipality as a whole, the most noteworthy areas are Murueta, with more than 25% of its surface area at risk, and Sestao and Gautegez-Arteaga (>15%).

Erosion assessment (the effect of sea level rise) yields the following results. Following the analysis of 28 beaches, which together account for some 97 ha of dry area, it is expected that by 2050 around 15 ha (about 15%) would be lost, and by 2100: 32 ha in the best-case scenario, 42 ha in the intermediate scenario and 50 ha in the worst-case one. The loss of dry beach would mostly affect Itzurun; Isuntza, Muriola and Gaztetape in the RCP 4.5 scenario (with more than 35% of dry beach area lost) and Isuntza, Ondar Gain and Ereaga (with more than 75% of dry beach area lost) in the RCP 8.5 worst-case scenario.

In economic terms, losses of dry beach area would translate into losses of €765 million by the 2050 time horizon. Losses would reach €1.6 billion by 2100 in the best-case scenario, about €2.2 billion in the intermediate scenario and about €2.6 billion in the worst-case scenario. These results, considered as economic values, should be treated with caution, as the economic valuation of impacts on beaches in the long term depends on socio-economic variables that are difficult to evaluate. The beaches with the greatest risk of economic impact on tourism would be Ereaga, Hondarribia, Zarautz and Plentzia by 2050 and, in addition to these, Deba, La Arena, Bakio and La Zurriola by 2100.

Going back to the analysis of flooding, in the context of this study it should be noted that “impact/flooding” is understood as a low likelihood of flood events. A detailed mapping of the depth or thickness of this flood was prepared for the current climate, for 2050 and 2100 with high return periods (100 and 500 years), with the geographical configuration (protection elements, channels, ports, embankments, etc.) included in the best available mapping along with the distribution of the present population. The main mapping results are available on the GIS viewer website <https://gis.ihobe.eus/kostaegoki> and, partially, the geoEuskadi website (<https://www.geo.euskadi.eus>).

As far the impact on the socio-economic components is concerned, an estimated 15,000 people could be affected by 2050, and 130 ha and 100 ha of residential and industrial land could be lost, respectively. By 2100, in the most optimistic scenario, flooding could affect around 22,000 people, 173 ha of residential land and 127 ha of industrial land. In the intermediate scenarios (scenarios 7 and 8), the potential impact would be between 23,000 and 34,000 people, and 180-230 ha and 133-184 ha of residential and industrial land, respectively. In the most pessimistic scenario, more than 42,000 people, 285 ha of residential land and 261 ha of industrial land would be at risk. The table below summarises these results.

TOTAL LAND AREA POTENTIALLY FLOODED, POPULATION POTENTIALLY AFFECTED AND RESIDENTIAL AND INDUSTRIAL LAND AREA (ECONOMIC ACTIVITIES) POTENTIALLY AFFECTED

VARIABLES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
SURFACE AREA FLOODED (HA)	1,676	1,734	1,929	1,972	2,135	2,179	2,301	2,386	2,660	2,718
POPULATION (PEOPLE)	7,847	8,515	15,008	15,697	21,932	25,509	23,033	33,961	39,842	42,318
RESIDENTIAL LAND AREA (HA)	71	76	129	136	173	199	180	230	274	285
INDUSTRIAL LAND (HA)	54	60	97	104	127	168	133	184	248	261

The analysis of the impact on critical subsystems only provides complete estimates in the case of airports and heliports. In the case of both roads and critical companies, there is a lack of information on levels of people and geo-referenced land areas, meaning it was not possible to estimate the number of people and land area potentially affected.

According to the analysis, Hondarribia airport would be the only airport infrastructure that would be affected. Furthermore, it would be affected by any of the scenarios proposed in the study, although, evidently, the higher the sea level and the higher the RP, the more intense the impact/flooding would be.

In the case of roads and railways, the estimate for 2050 predicts that 12-13 km of track would be flooded (in certain cases, with RPs of 100 and 500 years). In 2100, the estimate is 22 km in the best-case scenario, 24 km in the intermediate case and 57 km in the worst case.

Railway lines and roads with stretches that could potentially be flooded in all scenarios are the Bilbao Tram and Metro line and the N-638 and GI-3161. The Bilbao - Bermeo railway line and the BI-711 and GI-636 roads have stretches that could potentially be flood-prone in 2050 and 2100. In the worst-case scenario, in addition to those mentioned above, the stretches that could potentially be flooded are the Port of Pasaia Rail Network, La Naval-Sestao Rail Network, Madrid-Irún, Bilbao-Donostia, Bilbao-Santurtzi, Bilbao-Muskiz, Alonsotegi-Burtzeña and Lutxana-Sondika railway lines, and the N-636, BI-644, BI-735, BI-2122 and GI-2137 roads.

The results for critical infrastructures, particularly communication lines that may run underground or over viaducts are estimates obtained by superimposing the flood-prone areas over the ground plan of the infrastructures. The height at which each stretch is located in the case of elevated elements is not available. The means of protection or waterproofing, in the case of underground elements, have not been taken into account either.

The existing approaches and assumptions used to work with socio-economic indicators determine the results and how they are interpreted, and there are no data available to calibrate and validate the results even approximately. This is very important when it comes to socio-economic variables such as flood spots and erosive effects on beaches in the future. These limitations should be taken into account in further work.

As far as environmental risk is concerned, the habitats and species at risk from flooding in the worst-case scenario, Scenario 10, would be as follows:

- the European mink (*Mustela lutreola*) is the species of fauna that would have the greatest impact in terms of range and distribution in all the protected areas, except in the protected nature areas in the autonomous communities (protected biotopes and nature reserves). The three-spined stickleback (*Gasterosteus aculeatus*), Mediterranean tree frog (*Hyla meridionalis*), European storm petrel (*Hydrobates pelagicus*) and European shag (*Phalacrocorax aristotelis*) are wildlife species whose range would be affected, but to a lesser extent than that of the European mink.
- Dwarf eelgrass (*Zostera noltii*) is the species of flora that would have the greatest impact in all the protected areas, except in the protected nature areas in the autonomous communities (protected biotopes and nature reserves). There are a variety of species other than dwarf eelgrass whose range and distribution would be affected, but to a lesser extent.
- Habitats of community interest: habitat types 1170 (reefs), 1130 (estuaries) and 1410 (Mediterranean salt marshes, *Juncetalia maritimae*) are those that would be most affected in terms of their range and distribution in all areas analysed. Also affected would be habitat type 1420 (Mediterranean and thermo-Atlantic halophilous scrubs *Sarcocornetea fruticosi*), but to

a lesser degree. There are a variety of other habitats whose range and distribution would be affected, but to a lesser extent.

- EUNIS habitats X01 (estuaries), A2.636 (sea rushes, *Juncus maritimus*) and B (coastal habitats) would have the greatest impact in terms of their range in Natura 2000 Network sites, biosphere reserves, RAMSAR sites and transitional bodies of water, EUNIS habitats B3.23 (unvegetated coastal cliffs and rocks) and A1.211 (*Pelvetia canaliculata* and barnacles on moderately exposed rocky shores) in natural spaces protected by regional legislation (in the San Juan de Gaztelugatxe protected biotope). The habitats affected in coastal bodies of water would be: EUNIS habitat A1.11 (communities of mussels and/or barnacles), A3.13 (Mediterranean and Pontic communities of infralittoral algae very exposed to wave action) and A3.15 (frondose algal communities).

Lastly, the results for the areas concerned, where the fifteen port installations under the jurisdiction of the Basque Country are located, indicate that protection and accommodation measures will be the priority, particularly for the 2050 time horizon. Neither previous information on damage nor projections for 2050 justify considering measures to combat shoreline retreat for the time being.

The work carried out suggests that measures such as raising the height of harbour esplanades, protecting buildings in areas at risk and assessing the stability of shelters will be effective in meeting the challenges of rising sea levels by 2050. Ocean and meteorological monitoring, event-based surveillance and an inventory of damage will improve risk assessment in the longer term (2100 time horizon).

The increase in the current and predicted level of risk in 2050 in the urban areas surrounding the areas concerned, particularly the ports under the jurisdiction of the Basque Government, is not very noticeable, at least with the +26 cm rise in the average sea level considered. The forecast for 2100 involves a much greater predicted impact on several inland estuary locations with port facilities, more so in Gipuzkoa (Zumaia and Orio in particular) than in Bizkaia (Ondarroa and Plentzia with port areas and Erandio without).

In the longer term, 2100, the central objective should be to avoid increasing coastal vulnerability with new elements in potentially flood-prone areas and to monitor the evolution of the level of risk for existing elements in order to anticipate protective measures or remove specific elements.

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ANNEXES

FLOODING TABLES

HECTARES OF POTENTIALLY AFFECTED AREA

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	23.55	24.35	28.32	29.28	32.14	34.22	32.8	34.7	36.66	37.29
AJANGIZ	0.3	0.3	0.32	0.32	0.34	0.36	0.34	0.36	0.41	0.42
AMOROTO	0.21	0.21	0.22	0.23	0.24	0.25	0.24	0.26	0.28	0.28
ARRATZU	0.58	0.73	1.88	2.58	4.84	6.86	5.3	7.37	9.56	9.97
ASTIGARRAGA	3.02	3.06	3.3	3.36	3.67	4.08	3.74	4.19	4.65	4.77
BAKIO	15.07	15.58	15.66	16.21	19.39	22.3	20.29	23.18	26.22	27.32
BARAKALDO	15.5	16.13	21.15	22.14	27.34	33.15	28.82	35	42.61	44.32
BARRIKA	16.47	16.7	18.37	18.64	19.64	20.51	19.91	20.78	21.85	22.08
BERMEO	21.22	21.99	22.14	22.9	23.15	23.85	23.88	25.97	28.28	29.12
BERRIATUA	7.08	7.22	7.54	7.69	7.97	8.77	8.11	8.98	9.55	9.72
BILBAO	20.29	21.71	43.14	46.07	59.4	71.3	62.43	73.92	89.37	91.58
BUSTURIA	89.58	90.33	93.56	94.32	100.53	104.21	101.59	105.14	109.45	110.34
DEBA	22.67	23.72	26.28	27.18	30.22	32.43	31.1	33.22	38.42	39.11
DONOSTIA	46.26	48.01	55.97	57.84	68.49	73.82	71.18	80.14	87.39	94.22
EA	14.63	15.58	15.17	16.13	15.71	16.12	16.69	17.1	16.78	17.79
ELANTXOBE	4.42	4.57	4.54	4.67	4.64	4.7	4.75	4.81	4.8	4.9
ERANDIO	29.52	31.72	43.93	46.64	59.38	73.61	62.67	76.69	91.2	93.49
ERRENTERIA	2.99	3.03	3.25	3.22	3.89	6.62	4.3	7.23	9.92	10.28
FORUA	61.15	67.57	72.18	72.78	75.97	78.07	76.47	78.48	81.8	82.14
GATIKA	4.94	5.04	5.41	5.52	5.88	6.19	5.97	6.26	6.82	6.93
GAUTEGIZ-	194.5	195.22	199.39	200.18	203.81	206.07	204.47	206.87	209.76	210.21
GERNIKA-LUMO	5.45	5.91	8.24	8.88	12.59	15.36	13.22	15.93	27.6	28.92
GETARIA	20.03	20.63	20.5	20.99	20.92	21.18	21.3	21.52	21.55	21.87
GETXO	19.01	19.36	20.54	20.86	22.34	24.4	22.79	46.73	53.17	54.48
GORLIZ	18.6	18.8	19.52	19.69	20.34	20.88	20.5	21.04	21.72	21.86
HERNANI	1.85	1.91	2.15	2.2	2.41	4.02	2.46	4.14	4.7	4.81
HONDARRIBIA	147.49	151.81	167.35	171.4	181.95	190.2	184.67	192.94	209.48	212.59
IBARRANGELU	18.04	18.34	19.03	19.32	20.18	20.94	20.48	21.19	21.87	22.1
IRÚN	66.91	68.41	93.06	94.64	104.51	111.75	106.36	113.33	120.67	123.61
ISPASTER	8.6	8.93	8.89	9.21	9.19	9.44	9.53	9.77	9.86	10.21
KORTEZUBI	65.14	66.68	70.99	71.64	73.78	76.48	75	76.9	79.78	80.24
LEIOA	4.52	4.62	5.16	5.48	7.55	18.65	7.86	24.97	38.37	41.39
LEKEITIO	6.93	7.04	7.36	7.46	7.8	8.42	7.97	8.58	9.04	9.14
LEMOIZ	16.08	16.28	16.73	16.94	17.39	17.88	17.61	18.04	18.53	18.67
LEZO	0.12	0.12	0.14	0.18	0.22	1.8	0.29	3.6	8.55	9.01
LOIU	0.21	0.22	0.26	0.27	0.3	0.33	0.31	0.34	0.52	0.53
MENDARO	0.68	0.69	0.8	0.83	1.28	1.44	1.33	1.48	1.74	1.79
MENDEXA	22.06	22.52	22.99	23.49	23.87	24.47	24.32	24.92	25.43	25.83
MUNDAKA	8.07	8.19	8.34	8.46	8.6	8.8	8.72	9.91	10.92	11.16
MURUETA	122.92	139.29	142.57	143.07	145.79	148.42	146.15	148.74	150.3	150.52
MUSKIZ	41.02	41.63	43.89	44.85	47.31	49.71	48.04	50.52	55.93	56.93
MUTRIKU	24.17	24.92	25.66	26.22	27.05	28.41	27.54	28.94	30.63	31.11
ONDARROA	18.2	18.82	22.67	23.48	26.07	27.66	26.52	28.06	29.95	30.35
ORIO	50.06	50.59	60.19	61.38	65.46	69.3	66.42	70.22	75.45	76.35
PASAI	10.03	10.51	11.03	11.52	12.28	16.54	12.96	22.66	38.4	41.38
PLENTZIA	35.01	35.73	38.67	39.23	42.66	47.02	43.65	47.8	51.28	51.79
PORTUGALETE	1.02	1.04	1.13	1.15	1.26	1.63	1.3	1.84	2.5	2.72
SANTURTZI	2.87	2.92	3.13	3.19	3.53	3.93	3.65	4	4.41	5.08
SESTAO	6.48	6.68	17.54	18.68	29.78	40.22	31.92	43.37	58.1	61.02
SONDIKA	1.6	1.62	1.71	1.73	1.83	1.99	1.87	2.04	2.41	2.51
SOPELA	8.4	8.54	9.08	9.21	9.68	10.09	9.79	10.2	10.68	10.77
SUKARRIETA	5.13	5.32	6.27	6.47	7.25	8.25	7.43	8.48	9.32	9.43
USURBIL	35.07	36.24	45.38	46.86	50.99	54.51	51.72	55.41	61.53	62.43
VALLEY	1.3	1.32	10.47	11.03	12.63	15.26	12.89	17.35	38.42	41.86
ZARAUZ	28.34	29	30.93	31.86	33.74	36.03	34.89	36.68	38.85	39.52
ZESTOA	0.36	0.38	0.44	0.46	0.56	0.64	0.58	0.66	0.73	0.74
ZIERBENA	13.58	13.75	14.45	14.6	15.25	15.92	15.4	16.08	17.03	17.29
ZUMAIA	30.1	33.78	47.15	50.62	61.52	71.22	64.66	74.05	88.07	90.54

PERCENTAGE OF POTENTIALLY AFFECTED AREA

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	0.41	0.42	0.49	0.51	0.56	0.6	0.57	0.6	0.64	0.65
AJANGIZ	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06
AMOROTO	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
ARRATZU	0.06	0.07	0.19	0.25	0.48	0.68	0.52	0.73	0.94	0.98
ASTIGARRAGA	0.25	0.26	0.28	0.28	0.31	0.34	0.31	0.35	0.39	0.4
BAKIO	0.92	0.95	0.95	0.99	1.18	1.36	1.24	1.41	1.6	1.66
BARAKALDO	0.61	0.64	0.84	0.88	1.08	1.32	1.14	1.39	1.69	1.76
BARRIKA	2.15	2.18	2.4	2.44	2.57	2.68	2.6	2.72	2.86	2.89
BERMEO	0.64	0.67	0.67	0.69	0.7	0.72	0.72	0.79	0.86	0.88
BERRIATUA	0.37	0.38	0.39	0.4	0.42	0.46	0.42	0.47	0.5	0.51
BILBAO	0.5	0.54	1.07	1.14	1.47	1.77	1.55	1.83	2.21	2.27
BUSTURIA	4.4	4.44	4.59	4.63	4.94	5.12	4.99	5.16	5.37	5.42
DEBA	0.45	0.47	0.52	0.54	0.6	0.65	0.62	0.66	0.77	0.78
DONOSTIA	0.76	0.79	0.92	0.95	1.12	1.21	1.17	1.32	1.43	1.55
EA	1.05	1.12	1.09	1.16	1.13	1.16	1.2	1.23	1.2	1.28
ELANTXOBE	2.47	2.55	2.54	2.61	2.59	2.63	2.65	2.69	2.68	2.74
ERANDIO	1.58	1.69	2.35	2.49	3.17	3.93	3.35	4.1	4.87	4.99
ERRETERIA	0.1	0.1	0.1	0.1	0.12	0.21	0.14	0.23	0.32	0.33
FORUA	8.08	8.93	9.54	9.62	10.04	10.32	10.11	10.37	10.81	10.86
GATIKA	0.29	0.29	0.31	0.32	0.34	0.36	0.35	0.36	0.4	0.4
GAUTEGIZ-	14.34	14.39	14.7	14.76	15.02	15.19	15.07	15.25	15.46	15.5
GERNIKA-LUMO	0.64	0.69	0.96	1.04	1.47	1.79	1.54	1.86	3.22	3.38
GETARIA	1.88	1.93	1.92	1.97	1.96	1.98	2	2.02	2.02	2.05
GETXO	1.59	1.62	1.71	1.74	1.87	2.04	1.9	3.9	4.44	4.55
GORLIZ	1.88	1.9	1.98	1.99	2.06	2.11	2.08	2.13	2.2	2.21
HERNANI	0.05	0.05	0.05	0.06	0.06	0.1	0.06	0.1	0.12	0.12
HONDARRIBIA	4.96	5.1	5.62	5.76	6.11	6.39	6.21	6.48	7.04	7.14
IBARRANGELU	1.25	1.27	1.32	1.34	1.4	1.45	1.42	1.47	1.52	1.53
IRÚN	1.6	1.63	2.22	2.26	2.49	2.66	2.54	2.7	2.88	2.95
ISPASTER	0.38	0.39	0.39	0.4	0.4	0.41	0.42	0.43	0.43	0.45
KORTEZUBI	5.56	5.69	6.06	6.12	6.3	6.53	6.4	6.56	6.81	6.85
LEIOA	0.54	0.55	0.62	0.66	0.91	2.24	0.94	3	4.6	4.97
LEKEITIO	3.72	3.79	3.96	4.01	4.2	4.52	4.28	4.61	4.86	4.91
LEMOIZ	0.86	0.87	0.89	0.9	0.93	0.95	0.94	0.96	0.99	0.99
LEZO	0.01	0.01	0.02	0.02	0.03	0.21	0.03	0.42	1	1.06
LOIU	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04
MENDARO	0.03	0.03	0.03	0.03	0.05	0.06	0.05	0.06	0.07	0.07
MENDEXA	3.17	3.24	3.31	3.38	3.43	3.52	3.5	3.58	3.66	3.71
MUNDAKA	1.99	2.02	2.06	2.09	2.12	2.17	2.15	2.45	2.7	2.75
MURUETA	23.16	26.24	26.86	26.96	27.47	27.97	27.54	28.02	28.32	28.36
MUSKIZ	1.93	1.95	2.06	2.1	2.22	2.33	2.25	2.37	2.63	2.67
MUTRIKU	0.87	0.9	0.93	0.95	0.98	1.03	0.99	1.05	1.11	1.12
ONDARROA	4.35	4.49	5.41	5.61	6.23	6.6	6.33	6.7	7.15	7.25
ORIO	5.23	5.28	6.29	6.41	6.84	7.24	6.94	7.33	7.88	7.97
PASAIA	0.95	0.99	1.04	1.09	1.16	1.56	1.22	2.14	3.63	3.91
PLENTZIA	5.95	6.07	6.57	6.67	7.25	7.99	7.42	8.12	8.71	8.8
PORTUGALETE	0.31	0.31	0.34	0.34	0.38	0.49	0.39	0.55	0.75	0.82
SANTURTZI	0.32	0.33	0.35	0.36	0.4	0.44	0.41	0.45	0.49	0.57
SESTAO	1.82	1.88	4.93	5.25	8.38	11.31	8.98	12.2	16.34	17.16
SONDIKA	0.24	0.25	0.26	0.26	0.28	0.3	0.29	0.31	0.37	0.38
SOPELA	1.03	1.05	1.12	1.13	1.19	1.24	1.2	1.25	1.31	1.32
SUKARRIETA	3.36	3.48	4.1	4.23	4.74	5.4	4.86	5.54	6.09	6.17
USURBIL	1.36	1.41	1.76	1.82	1.98	2.12	2.01	2.15	2.39	2.43
VALLE	0.1	0.1	0.81	0.85	0.98	1.18	1	1.34	2.97	3.24
ZARAUTZ	2.16	2.21	2.36	2.43	2.57	2.75	2.66	2.8	2.96	3.01
ZESTOA	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
ZIERBENA	1.07	1.08	1.14	1.15	1.2	1.25	1.21	1.26	1.34	1.36
ZUMAIA	2.73	3.06	4.28	4.59	5.58	6.46	5.87	6.72	7.99	8.22

BEACH EROSION TABLES

POTENTIALLY ERODED BEACH AREA

BEACHES (m ²)	CLIMATE SCENARIOS			
	RCP 8.5 2050 (+26 cm)	RCP 4.5 2100 (+51 cm)	RCP 8.5 2100 (+71 cm)	RCP max. 2100 (+100 cm)
La Arena	8795	21042	30075	40852
Ereaga	15617	30697	47722	54056
Arrigunaga	2566	6139	8774	11919
Aizkorri	5624	11944	11944	11944
Barinatxe	7624	17802	24784	28440
Arriatara	9335	19503	20061	20061
Muriola	930	1199	1199	1199
Plentzia	14586	21177	31560	33802
Bakio	7635	17044	21675	27135
Laidatxu	819	1820	2638	3639
Laga	3738	8942	12781	17347
Isuntza	3266	5911	5911	5911
Karraspio	542	11881	11881	11881
Arrigorri	1436	3387	4701	6267
Saturraran	1889	4520	6460	7910
Ondargain	1209	2832	3871	4300
Ondarbeltz	1284	2670	3615	4858
Deba	4412	10555	15087	20495
Itzurun	2250	4173	4173	4173
Santiago	2728	6528	9330	12675
Gaztetape	1604	1604	1604	1604
Malkorbe	1924	4491	6346	8418
Zarautz	18730	34033	34112	34112
Antilla	1759	4209	6016	8172
Ondarreta	2479	5932	8397	11175
La Concha	4717	11286	13342	14379
La Zurriola	7832	18740	26785	36385
Hondarribia	12219	29236	41790	56771

PERCENTAGE OF POTENTIALLY ERODED BEACH AREA

BEACHES	CLIMATE SCENARIOS			
	RCP 8.5 2050 (+26 cm)	RCP 4.5 2100 (+51 cm)	RCP 8.5 2100 (+71 cm)	RCP max. 2100 (+100 cm)
La Arena	14	34	48	66
Ereaga	24	47	73	83
Arrigunaga	6	14	19	26
Aizkorri	26	56	56	56
Barinatxe	15	35	49	56
Arriatara	27	55	57	57
Muriola	51	65	65	65
Plentzia	17	25	37	39
Bakio	17	38	48	60
Laidatxu	9	20	29	40
Laga	11	27	39	53
Isuntza	43	77	77	77
Karraspio	34	74	74	74
Arrigorri	12	28	39	52
Saturran	16	38	54	66
Ondargain	22	52	71	79
Ondarbeltz	14	30	40	54
Deba	16	38	55	74
Itzurun	40	75	75	75
Santiago	7	17	24	33
Gaztetape	52	52	52	52
Malkorbe	14	33	47	63
Zarautz	26	47	47	47
Antilla	5	12	18	24
Ondarreta	7	17	24	32
La Concha	12	30	35	38
La Zurriola	11	27	38	52
Hondarribia	11	25	36	49

POPULATION TABLES

NUMBER OF PEOPLE POTENTIALLY AFFECTED IN DEMOGRAPHIC SCENARIO 1

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	0	0	0	0	0	0	0	0	4	4
BAKIO	0	0	4	4	39	44	39	44	54	71
BARAKALDO	0	0	0	0	0	0	0	0	59	59
BARRIKA	0	0	22	22	70	95	70	100	117	117
BERMEO	0	0	0	0	11	11	11	16	25	25
BILBAO	8	8	204	350	870	1396	1015	1495	2237	2270
BUSTURIA	0	0	0	0	46	176	108	176	205	212
DEBA	0	0	0	0	273	436	362	447	627	627
DONOSTIA	21	133	147	165	1918	2124	2016	3257	2575	4085
EA	121	137	131	137	137	137	146	146	146	151
ERANDIO	5434	5736	6782	6812	7803	8290	8014	8373	8724	8757
ERRETERIA	0	0	0	0	0	0	0	0	205	205
FORUA	0	0	0	0	27	53	53	53	53	53
GAUTEGIZ-ARTEAGA	0	0	4	4	4	4	4	4	4	4
GERNIKA-LUMO	0	0	0	0	0	0	0	0	123	123
GETXO	0	0	0	0	0	0	0	6381	7407	7729
HONDARRIBIA	1070	1111	1315	1348	1526	1590	1557	1594	2626	2850
IRUN	899	954	3738	3898	5225	5962	5424	6256	6959	6995
LEIOA	0	0	0	5	5	108	5	276	382	464
MENDEXA	10	10	10	10	10	10	10	10	10	10
MURUETA	5	9	9	9	9	9	9	9	9	9
MUSKIZ	0	0	0	0	0	10	0	10	28	46
MUTRIKU	0	0	0	0	0	12	0	12	12	12
ONDARROA	117	187	536	577	694	765	739	793	866	866
ORIO	0	17	1019	1083	1481	1806	1582	1812	2168	2238
PASAIA	61	69	166	188	248	318	274	318	711	732
PLENTZIA	0	6	53	67	164	248	164	268	306	310
SESTAO	0	0	0	16	16	16	16	16	16	16
SONDIKA	0	0	0	0	0	4	0	4	4	4
SUKARRIETA	0	0	0	0	0	0	0	0	0	9
USURBIL	0	0	0	9	9	9	9	9	9	9
ZARAUTZ	0	0	4	31	17	36	31	36	36	36
ZUMAIA	71	138	864	962	1330	1840	1375	2046	3135	3220

NUMBER OF PEOPLE POTENTIALLY AFFECTED IN DEMOGRAPHIC SCENARIO 2

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	0	0	0	0	0	0	0	0	4	4
BAKIO	0	0	4	4	43	49	43	49	60	79
BARAKALDO	0	0	0	0	0	0	0	0	65	65
BARRIKA	0	0	24	24	78	106	78	111	130	130
BERMEO	0	0	0	0	12	12	12	17	27	27
BILBAO	8	8	225	387	970	1557	1132	1668	2496	2533
BUSTURIA	0	0	0	0	51	196	120	196	228	236
DEBA	0	0	0	0	304	486	403	498	699	699
DONOSTIA	21	133	162	182	2140	2370	2249	3634	2873	4558
EA	121	137	144	151	152	152	162	162	162	168
ERANDIO	5434	5736	7506	7539	8708	9251	8943	9344	9735	9772
ERRETERIA	0	0	0	0	0	0	0	0	228	228
FORUA	0	0	0	0	30	59	59	59	59	59
GAUTEGIZ-ARTEAGA	0	0	4	4	4	4	4	4	4	4
GERNIKA-LUMO	0	0	0	0	0	0	0	0	137	137
GETXO	0	0	0	0	0	0	0	7121	8266	8625
HONDARRIBIA	1070	1111	1455	1491	1703	1774	1737	1778	2930	3180
IRUN	899	954	4137	4314	5831	6653	6053	6981	7766	7806
LEIOA	0	0	0	5	5	120	5	308	426	517
MENDEXA	10	10	11	11	11	11	11	11	11	11
MURUETA	5	9	9	9	10	10	10	10	10	10
MUSKIZ	0	0	0	0	0	11	0	11	31	51
MUTRIKU	0	0	0	0	0	13	0	13	13	13
ONDARROA	117	187	593	638	774	853	824	884	966	966
ORIO	0	17	1127	1198	1652	2015	1765	2022	2419	2497
PASAIA	61	69	183	208	276	354	305	354	793	816
PLENTZIA	0	6	58	74	183	276	183	299	341	345
SESTAO	0	0	0	17	17	17	17	17	17	17
SONDIKA	0	0	0	0	0	4	0	4	4	4
SUKARRIETA	0	0	0	0	0	0	0	0	0	10
USURBIL	0	0	0	9	10	10	10	10	10	10
ZARAUTZ	0	0	4	34	18	40	34	40	40	40
ZUMAIA	71	138	956	1064	1484	2053	1534	2283	3498	3593

NUMBER OF PEOPLE POTENTIALLY AFFECTED IN DEMOGRAPHIC SCENARIO 3

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	0	0	0	0	0	0	0	0	3	3
BAKIO	0	0	3	3	31	35	31	35	43	56
BARAKALDO	0	0	0	0	0	0	0	0	47	47
BARRIKA	0	0	19	19	56	76	56	80	93	93
BERMEO	0	0	0	0	8	8	8	12	20	20
BILBAO	8	8	177	304	697	1119	813	1198	1793	1820
BUSTURIA	0	0	0	0	36	141	86	141	164	170
DEBA	0	0	0	0	218	349	290	358	502	502
DONOSTIA	21	133	127	143	1538	1703	1616	2611	2064	3275
EA	121	137	114	119	109	109	117	117	117	121
ERANDIO	5434	5736	5904	5930	6257	6647	6426	6714	6995	7022
ERRETERIA	0	0	0	0	0	0	0	0	164	164
FORUA	0	0	0	0	21	42	42	42	42	42
GAUTEGIZ-ARTEAGA	0	0	3	3	3	3	3	3	3	3
GERNIKA-LUMO	0	0	0	0	0	0	0	0	98	98
GETXO	0	0	0	0	0	0	0	5116	5939	6197
HONDARRIBIA	1070	1111	1144	1173	1223	1275	1248	1278	2105	2285
IRUN	899	954	3254	3393	4189	4780	4349	5016	5580	5609
LEIOA	0	0	0	4	4	86	4	221	306	372
MENDEXA	10	10	8	8	8	8	8	8	8	8
MURUETA	5	9	7	7	7	7	7	7	7	7
MUSKIZ	0	0	0	0	0	8	0	8	22	36
MUTRIKU	0	0	0	0	0	9	0	9	9	9
ONDARROA	117	187	466	502	556	613	592	635	694	694
ORIO	0	17	887	942	1187	1448	1268	1453	1738	1794
PASAIA	61	69	144	163	198	255	219	255	570	586
PLENTZIA	0	6	46	58	131	198	131	214	245	248
SESTAO	0	0	0	13	12	12	12	12	12	12
SONDIKA	0	0	0	0	0	3	0	3	3	3
SUKARRIETA	0	0	0	0	0	0	0	0	0	7
USURBIL	0	0	0	7	7	7	7	7	7	7
ZARAUTZ	0	0	3	26	13	28	24	28	28	28
ZUMAIA	71	138	752	837	1066	1475	1102	1640	2513	2582

PERCENTAGE OF PEOPLE POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	0	0	0	0	0	0	0	0	0.25	0.25
BAKIO	0	0	0.19	0.19	1.88	2.12	1.88	2.12	2.61	3.43
BARAKALDO	0	0	0	0	0	0	0	0	0.06	0.06
BARRIKA	0	0	1.76	1.76	5.59	7.59	5.59	7.99	9.35	9.35
BERMEO	0	0	0	0	0.07	0.07	0.07	0.1	0.15	0.15
BILBAO	0	0	0.06	0.1	0.26	0.41	0.3	0.44	0.66	0.67
BUSTURIA	0	0	0	0	3.41	13.04	8	13.04	15.19	15.7
DEBA	0	0	0	0	5.43	8.67	7.2	8.89	12.47	12.47
DONOSTIA	0.01	0.08	0.08	0.09	1.09	1.21	1.15	1.85	1.47	2.33
EA	21.61	24.46	23.39	24.46	24.46	24.46	26.07	26.07	26.07	26.96
ERANDIO	23.96	25.29	29.9	30.03	34.4	36.55	35.33	36.91	38.46	38.61
ERRETERIA	0	0	0	0	0	0	0	0	0.52	0.52
FORUA	0	0	0	0	3.97	7.79	7.79	7.79	7.79	7.79
GAUTEGIZ-ARTEAGA	0	0	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
GERNIKA-LUMO	0	0	0	0	0	0	0	0	0.75	0.75
GETXO	0	0	0	0	0	0	0	8.5	9.87	10.3
HONDARRIBIA	6.82	7.08	8.38	8.59	9.73	10.14	9.92	10.16	16.74	18.17
IRUN	1.56	1.66	6.5	6.78	9.08	10.36	9.43	10.88	12.1	12.16
LEIOA	0	0	0	0.02	0.02	0.35	0.02	0.91	1.25	1.52
MENDEXA	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
MURUETA	2.49	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48
MUSKIZ	0	0	0	0	0	0.15	0	0.15	0.43	0.71
MUTRIKU	0	0	0	0	0	0.24	0	0.24	0.24	0.24
ONDARROA	1.37	2.19	6.29	6.77	8.14	8.98	8.67	9.3	10.16	10.16
ORIO	0	0.3	17.98	19.11	26.14	31.87	27.92	31.98	38.26	39.5
PASAIA	0.37	0.42	1.01	1.14	1.51	1.93	1.67	1.93	4.32	4.45
PLENTZIA	0	0.15	1.34	1.7	4.16	6.29	4.16	6.8	7.76	7.86
SESTAO	0	0	0	0.06	0.06	0.06	0.06	0.06	0.06	0.06
SONDIKA	0	0	0	0	0	0.11	0	0.11	0.11	0.11
SUKARRIETA	0	0	0	0	0	0	0	0	0	3.54
USURBIL	0	0	0	0.16	0.16	0.16	0.16	0.16	0.16	0.16
ZARAUTZ	0	0	0.02	0.14	0.08	0.16	0.14	0.16	0.16	0.16
ZUMAIA	0.74	1.44	9.02	10.04	13.89	19.21	14.36	21.36	32.73	33.62

TABLES OF EMPLOYEES BY SECTOR

Agriculture, livestock and fishing sector

ESTIMATED NUMBER OF PEOPLE EMPLOYED IN THE AGRICULTURE, LIVESTOCK AND FISHING SECTOR POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
BILBAO	0	0	0	0	0	0	0	0	4	4
DEBA	0	0	0	0	4	4	4	4	4	4
DONOSTIA	0	0	0	12	12	12	12	20	16	32
ERANDIO	28	28	28	28	28	28	28	28	28	28
GETXO	0	0	0	0	0	0	0	8	8	8
HONDARRIBIA	16	16	51	51	51	51	51	51	341	416
IRUN	0	0	4	4	8	8	8	8	8	8
ONDARROA	0	0	16	16	126	126	126	126	194	194
ORIO	0	0	4	4	4	74	4	74	109	113
PLENTZIA	0	0	0	0	4	4	4	4	4	4
ZUMAIA	0	0	0	0	4	4	4	4	16	16

ESTIMATED PERCENTAGE OF PEOPLE EMPLOYED IN THE AGRICULTURE, LIVESTOCK AND FISHING SECTOR POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
BILBAO	0	0	0	0	0	0	0	0	0.85	0.85
DEBA	0	0	0	0	1.75	1.75	1.75	1.75	1.75	1.75
DONOSTIA	0	0	0	2.68	2.68	2.68	2.68	4.47	3.58	7.16
ERANDIO	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33
GETXO	0	0	0	0	0	0	0	8.33	8.33	8.33
HONDARRIBIA	1.7	1.7	5.41	5.41	5.41	5.41	5.41	5.41	36.16	44.11
IRUN	0	0	2.22	2.22	4.44	4.44	4.44	4.44	4.44	4.44
ONDARROA	0	0	1.6	1.6	12.56	12.56	12.56	12.56	19.34	19.34
ORIO	0	0	2	2	2	37	2	37	54.5	56.5
PLENTZIA	0	0	0	0	12.5	12.5	12.5	12.5	12.5	12.5
ZUMAIA	0	0	0	0	2.88	2.88	2.88	2.88	11.51	11.51

Industry and energy sector

ESTIMATED NUMBER OF PEOPLE EMPLOYED IN THE MANUFACTURING SECTOR POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	183	200	200	200	204	204	204	204	204	204
BARAKALDO	0	0	0	0	0	75	0	75	75	75
BERMEO	0	0	0	0	0	12	0	12	12	12
BILBAO	75	83	386	398	402	441	406	516	567	567
BUSTURIA	0	0	0	0	0	4	0	4	4	4
DEBA	0	0	0	0	4	4	4	4	4	4
DONOSTIA	0	0	0	0	4	12	8	24	12	24
ERANDIO	702	702	927	935	1448	1798	1448	1798	2145	2263
GETARIA	32	67	67	67	67	67	67	67	67	67
GETXO	0	0	0	0	0	0	0	20	40	40
HONDARRIBIA	37	41	53	53	53	128	53	128	152	152
IRUN	375	375	399	399	407	411	407	411	415	415
LEIOA	0	0	0	0	4	1044	4	1073	1722	1757
MURUETA	0	75	75	75	75	75	75	75	75	75
MUTRIKU	0	0	0	0	0	0	0	12	12	12
ONDARROA	0	0	8	8	24	24	24	24	215	215
ORIO	0	0	25	25	33	33	33	33	37	37
PASAIA	0	0	0	0	0	0	0	0	75	114
PLENTZIA	0	0	0	0	4	4	4	4	4	4
SESTAO	0	0	55	55	130	130	130	130	134	134
VALLE	0	0	0	0	0	0	0	0	299	299
ZUMAIA	108	108	295	295	295	900	513	904	1404	1404

ESTIMATED PERCENTAGE OF PEOPLE EMPLOYED IN THE MANUFACTURING SECTOR POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	27.52	30.08	30.08	30.08	30.68	30.68	30.68	30.68	30.68	30.68
BARAKALDO	0	0	0	0	0	2.42	0	2.42	2.42	2.42
BERMEO	0	0	0	0	0	0.83	0	0.83	0.83	0.83
BILBAO	0.86	0.95	4.4	4.54	4.59	5.03	4.63	5.89	6.47	6.47
BUSTURIA	0	0	0	0	0	9.76	0	9.76	9.76	9.76
DEBA	0	0	0	0	0.15	0.15	0.15	0.15	0.15	0.15
DONOSTIA	0	0	0	0	0.07	0.2	0.13	0.4	0.2	0.4
ERANDIO	14.57	14.57	19.24	19.41	30.06	37.33	30.06	37.33	44.53	46.98
GETARIA	4.32	9.04	9.04	9.04	9.04	9.04	9.04	9.04	9.04	9.04
GETXO	0	0	0	0	0	0	0	2.8	5.59	5.59
HONDARRIBIA	11.94	13.23	17.1	17.1	17.1	41.29	17.1	41.29	49.03	49.03
IRUN	4.56	4.56	4.85	4.85	4.95	5	4.95	5	5.05	5.05
LEIOA	0	0	0	0	0.16	41.78	0.16	42.94	68.91	70.31
MURUETA	0	100	100	100	100	100	100	100	100	100
MUTRIKU	0	0	0	0	0	0	0	1.26	1.26	1.26
ONDARROA	0	0	2.14	2.14	6.43	6.43	6.43	6.43	57.64	57.64
ORIO	0	0	30.86	30.86	40.74	40.74	40.74	40.74	45.68	45.68
PASAIA	0	0	0	0	0	0	0	0	23.96	36.42
PLENTZIA	0	0	0	0	16.67	16.67	16.67	16.67	16.67	16.67
SESTAO	0	0	2.56	2.56	6.05	6.05	6.05	6.05	6.24	6.24
VALLE	0	0	0	0	0	0	0	0	6.2	6.2
ZUMAIA	3.2	3.2	8.73	8.73	8.73	26.64	15.18	26.75	41.55	41.55

ESTIMATED NUMBER OF PEOPLE EMPLOYED IN OTHER ACTIVITIES IN THE INDUSTRY AND ENERGY SECTOR POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	0	0	8	8	8	8	8	8	8	8
BERMEO	0	0	0	0	0	0	0	4	4	4
ERANDIO	375	375	375	375	375	375	375	375	606	606
GETARIA	0	0	0	0	0	0	0	0	0	4
GETXO	0	0	0	0	0	0	0	12	12	12
IRUN	0	0	0	0	0	8	0	8	8	8
PASAIA	0	0	0	0	0	0	0	0	0	8
SESTAO	0	0	0	375	375	375	375	375	375	375
ZUMAIA	4	4	4	4	8	8	8	8	8	8

ESTIMATED PERCENTAGE OF PEOPLE EMPLOYED IN OTHER ACTIVITIES IN THE INDUSTRY AND ENERGY SECTOR POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	0	0	66.67	66.67	66.67	66.67	66.67	66.67	66.67	66.67
BERMEO	0	0	0	0	0	0	0	16.67	16.67	16.67
ERANDIO	56.05	56.05	56.05	56.05	56.05	56.05	56.05	56.05	90.58	90.58
GETARIA	0	0	0	0	0	0	0	0	0	100
GETXO	0	0	0	0	0	0	0	27.27	27.27	27.27
IRUN	0	0	0	0	0	2.7	0	2.7	2.7	2.7
PASAIA	0	0	0	0	0	0	0	0	0	50
SESTAO	0	0	0	97.91	97.91	97.91	97.91	97.91	97.91	97.91
ZUMAIA	20	20	20	20	40	40	40	40	40	40

Construction sector

ESTIMATED NUMBER OF PEOPLE EMPLOYED IN THE CONSTRUCTION SECTOR POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	12	12	12	33	33	33	33	33	33	33
BERMEO	0	0	0	0	0	4	0	4	4	4
BILBAO	183	183	260	268	288	292	288	292	559	559
BUSTURIA	0	0	0	0	0	8	4	8	8	16
DEBA	0	0	0	0	4	4	4	4	4	4
DONOSTIA	0	0	0	0	103	123	111	163	127	183
EA	8	8	8	12	12	12	12	12	12	12
ERANDIO	446	466	589	589	784	1062	792	1062	1391	1491
ERREENTERIA	0	0	0	0	0	0	0	0	4	4
FORUA	0	0	0	0	8	12	12	12	12	12
GERNIKA-LUMO	0	0	0	0	0	0	0	0	8	8
GETXO	0	0	0	0	0	0	0	184	208	212
HONDARRIBIA	68	68	92	108	128	132	128	132	176	192
IRUN	52	64	224	224	260	264	260	268	296	300
LEIOA	0	0	0	0	0	4	0	83	87	87
MURUETA	0	0	0	0	0	0	0	0	4	4
MUSKIZ	0	0	0	0	0	0	0	0	0	4
ONDARROA	0	0	0	0	4	4	4	4	12	12
ORIO	0	0	56	64	84	112	84	112	124	140
PASAIA	4	4	8	8	8	12	12	12	32	36
PLENTZIA	0	0	4	4	4	12	4	12	16	16
VALLE	0	0	0	0	0	0	0	0	138	138
ZARAUTZ	0	0	0	4	0	4	4	4	4	4
ZUMAIA	4	4	24	24	36	48	36	52	100	100

ESTIMATED PERCENTAGE OF PEOPLE EMPLOYED IN THE CONSTRUCTION SECTOR POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	7.27	7.27	7.27	20	20	20	20	20	20	20
BERMEO	0	0	0	0	0	0.46	0	0.46	0.46	0.46
BILBAO	0.9	0.9	1.28	1.32	1.42	1.44	1.42	1.44	2.75	2.75
BUSTURIA	0	0	0	0	0	12.5	6.25	12.5	12.5	25
DEBA	0	0	0	0	2.42	2.42	2.42	2.42	2.42	2.42
DONOSTIA	0	0	0	0	0.93	1.11	1	1.47	1.15	1.65
EA	12.5	12.5	12.5	18.75	18.75	18.75	18.75	18.75	18.75	18.75
ERANDIO	11.05	11.54	14.59	14.59	19.42	26.31	19.62	26.31	34.46	36.93
ERRENTERIA	0	0	0	0	0	0	0	0	0.19	0.19
FORUA	0	0	0	0	14.29	21.43	21.43	21.43	21.43	21.43
GERNIKA-LUMO	0	0	0	0	0	0	0	0	0.77	0.77
GETXO	0	0	0	0	0	0	0	7.59	8.58	8.74
HONDARRIBIA	9.94	9.94	13.45	15.79	18.71	19.3	18.71	19.3	25.73	28.07
IRUN	1.35	1.66	5.8	5.8	6.74	6.84	6.74	6.94	7.67	7.77
LEIOA	0	0	0	0	0	0.24	0	5.06	5.3	5.3
MURUETA	0	0	0	0	0	0	0	0	25	25
MUSKIZ	0	0	0	0	0	0	0	0	0	0.76
ONDARROA	0	0	0	0	1.92	1.92	1.92	1.92	5.77	5.77
ORIO	0	0	17.95	20.51	26.92	35.9	26.92	35.9	39.74	44.87
PASAIA	0.49	0.49	0.98	0.98	0.98	1.46	1.46	1.46	3.9	4.39
PLENTZIA	0	0	2.94	2.94	2.94	8.82	2.94	8.82	11.76	11.76
VALLE	0	0	0	0	0	0	0	0	8.18	8.18
ZARAUTZ	0	0	0	0.33	0	0.33	0.33	0.33	0.33	0.33
ZUMAIA	1.33	1.33	7.97	7.97	11.96	15.95	11.96	17.28	33.22	33.22

Service sector

ESTIMATED NUMBER OF PEOPLE EMPLOYED IN THE TRADE, HOTEL AND CATERING AND TRANSPORT SECTORS POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	87	87	87	87	103	103	103	103	103	103
BAKIO	8	8	16	16	20	20	20	32	32	32
BARRIKA	0	0	0	0	0	4	0	4	4	4
BERMEO	0	0	0	0	12	12	12	12	33	41
BILBAO	12	16	204	271	323	414	339	430	610	610
BUSTURIA	0	0	0	0	0	8	4	8	8	8
DEBA	0	0	0	0	64	80	76	80	84	88
DONOSTIA	0	64	64	89	257	305	261	777	429	1268
EA	44	44	44	48	48	48	48	48	48	52
ELANTXOBE	12	12	12	12	12	12	12	12	12	12
ERANDIO	943	959	1274	1278	1702	1936	1860	1960	2342	2535
ERRETERIA	0	0	0	0	0	0	0	0	36	36
GERNIKA-LUMO	0	0	0	0	0	0	0	0	44	44
GETARIA	155	155	155	155	155	155	155	159	155	159
GETXO	0	0	0	0	0	0	0	1292	1496	1552
HONDARRIBIA	430	430	458	458	514	776	518	776	1332	1380
IRUN	192	285	919	947	1348	1463	1372	1507	1627	1627
LEIOA	0	0	0	0	8	36	8	280	317	696
MENDEXA	0	0	0	0	0	0	0	0	0	8
MUNDAKA	0	0	0	0	0	0	0	0	17	17
MUSKIZ	0	0	0	0	0	8	0	8	48	48
MUTRIKU	0	0	0	0	0	20	0	20	20	20
ONDARROA	80	88	132	160	245	289	269	297	373	373
ORIO	0	16	280	292	360	384	376	384	412	416
PASAIA	51	51	79	91	99	123	107	123	310	435
PLENTZIA	0	0	68	72	108	136	120	152	192	196
SESTAO	0	0	0	4	4	4	4	4	8	8
SUKARRIETA	0	0	0	0	0	4	0	4	8	8
USURBIL	0	0	0	8	8	8	8	8	8	8
VALLE	0	0	375	375	375	375	375	375	527	527
ZARAUTZ	0	0	0	16	12	16	16	16	16	16
ZUMAIA	48	60	361	377	477	545	477	565	693	701

ESTIMATED PERCENTAGE OF PEOPLE EMPLOYED IN THE TRADE, HOTEL AND CATERING AND TRANSPORT SECTORS POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	22.54	22.54	22.54	22.54	26.68	26.68	26.68	26.68	26.68	26.68
BAKIO	1.94	1.94	3.87	3.87	4.84	4.84	4.84	7.75	7.75	7.75
BARRIKA	0	0	0	0	0	2	0	2	2	2
BERMEO	0	0	0	0	0.48	0.48	0.48	0.48	1.31	1.63
BILBAO	0.01	0.02	0.23	0.31	0.37	0.48	0.39	0.49	0.7	0.7
BUSTURIA	0	0	0	0	0	5.56	2.78	5.56	5.56	5.56
DEBA	0	0	0	0	4.41	5.51	5.23	5.51	5.79	6.06
DONOSTIA	0	0.12	0.12	0.17	0.48	0.57	0.49	1.44	0.8	2.36
EA	47.83	47.83	4.83	52.17	52.17	52.17	52.17	52.17	52.17	56.52
ELANTXOBE	21.43	21.43	21.43	21.43	21.43	21.43	21.43	21.43	21.43	21.43
ERANDIO	10.56	10.74	14.27	14.31	19.06	21.68	20.83	21.95	26.23	28.39
ERRETERIA	0	0	0	0	0	0	0	0	0.57	0.57
GERNIKA-LUMO	0	0	0	0	0	0	0	0	1.12	1.12
GETARIA	19.67	19.67	19.67	19.67	19.67	19.67	19.67	20.18	19.67	20.18
GETXO	0	0	0	0	0	0	0	10.7	12.39	12.86
HONDARRIBIA	10.53	10.53	11.22	11.22	12.59	19.01	12.69	19.01	32.63	33.81
IRÚN	0.87	1.28	4.14	4.27	6.08	6.59	6.18	6.79	7.33	7.33
LEIOA	0	0	0	0	0.08	0.36	0.08	2.81	3.18	6.99
MENDEXA	0	0	0	0	0	0	0	0	0	8.33
MUNDAKA	0	0	0	0	0	0	0	0	4.76	4.76
MUSKIZ	0	0	0	0	0	0.7	0	0.7	4.21	4.21
MUTRIKU	0	0	0	0	0	2.84	0	2.84	2.84	2.84
ONDARROA	5.2	5.72	8.58	10.4	15.93	18.79	17.49	19.31	24.25	24.25
ORIO	0	1.54	27	28.16	34.72	37.03	36.26	37.03	39.73	40.12
PASAIA	1.61	1.61	2.5	2.87	3.13	3.89	3.38	3.89	9.79	13.74
PLENTZIA	0	0	11.66	12.35	18.52	23.33	20.58	26.07	32.93	33.62
SESTAO	0	0	0	0.09	0.09	0.09	0.09	0.09	0.18	0.18
SUKARRIETA	0	0	0	0	0	7.55	0	7.55	15.09	15.09
USURBIL	0	0	0	0.28	0.28	0.28	0.28	0.28	0.28	0.28
VALLE	0	0	7.95	7.95	7.95	7.95	7.95	7.95	11.17	11.17
ZARAUTZ	0	0	0	0.3	0.23	0.3	0.3	0.3	0.3	0.3
ZUMAIA	2.49	3.12	18.76	19.59	24.79	28.33	24.79	29.37	36.02	36.43

ESTIMATED NUMBER OF PEOPLE EMPLOYED IN THE PUBLIC ADMINISTRATION, TRADE, HEALTH AND SOCIAL SERVICES SECTORS POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
BAKIO	0	0	0	0	0	4	0	4	4	4
BARAKALDO	0	0	0	0	0	4	0	4	8	8
BARRIKA	0	0	12	12	16	16	16	16	16	16
BILBAO	24	32	73	73	118	730	122	777	2180	2180
DEBA	0	0	0	0	33	33	33	33	41	45
DONOSTIA	0	12	12	16	85	97	89	260	363	550
EA	16	20	20	36	36	36	36	36	36	36
ELANTXOBE	4	4	4	4	4	4	4	4	4	4
ERANDIO	807	811	827	1002	1641	1661	1649	1661	1740	2498
GETARIA	12	12	12	12	12	12	12	12	12	12
GETXO	0	0	0	0	0	0	0	2128	2421	2437
HONDARRIBIA	48	48	48	48	56	64	64	64	223	227
IRUN	41	45	629	645	727	800	747	812	1386	1386
LEIOA	0	0	0	0	0	12	0	445	449	449
LEZO	0	0	0	0	0	0	0	0	4	4
MUSKIZ	0	0	0	0	0	0	0	0	75	75
ONDARROA	28	28	40	215	262	309	262	309	317	317
ORIO	8	8	211	227	322	346	338	346	378	382
PASAIA	0	0	0	4	4	4	4	4	16	16
PLENTZIA	0	0	0	0	0	91	8	91	178	178
SESTAO	0	0	0	4	4	4	4	4	4	4
VALLE	0	0	0	0	0	0	0	0	6	6
ZARAUTZ	0	0	0	4	0	4	4	4	4	4
ZUMAIA	123	131	155	159	192	204	192	204	419	419

ESTIMATED PERCENTAGE OF PEOPLE EMPLOYED IN THE PUBLIC ADMINISTRATION, TRADE, HEALTH AND SOCIAL SERVICES SECTORS POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
BAKIO	0	0	0	0	0	0.97	0	0.97	0.97	0.97
BARAKALDO	0	0	0	0	0	0.02	0	0.02	0.04	0.04
BARRIKA	0	0	3.58	3.58	4.78	4.78	4.78	4.78	4.78	4.78
BILBAO	0.02	0.03	0.07	0.07	0.11	0.69	0.12	0.74	2.07	2.07
DEBA	0	0	0	0	4.73	4.73	4.73	4.73	5.88	6.46
DONOSTIA	0	0.02	0.02	0.02	0.12	0.14	0.13	0.37	0.52	0.79
EA	18.82	23.53	23.53	42.35	42.35	42.35	42.35	42.35	42.35	42.35
ELANTXOBE	25	25	25	25	25	25	25	25	25	25
ERANDIO	10.05	10.1	10.3	12.48	20.44	20.68	20.54	20.68	21.67	31.11
GETARIA	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
GETXO	0	0	0	0	0	0	0	14.46	16.45	16.56
HONDARRIBIA	1.29	1.29	1.29	1.29	1.51	1.72	1.72	1.72	5.99	6.1
IRÚN	0.42	0.46	6.47	6.63	7.47	8.22	7.68	8.35	14.25	14.25
LEIOA	0	0	0	0	0	0.14	0	5.27	5.32	5.32
LEZO	0	0	0	0	0	0	0	0	0.37	0.37
MUSKIZ	0	0	0	0	0	0	0	0	3.92	3.92
ONDARROA	1.88	1.88	2.69	14.46	17.62	20.78	17.62	20.78	21.32	21.32
ORIO	1.31	1.31	34.42	37.03	52.53	56.44	55.14	56.44	61.66	62.32
PASAIA	0	0	0	0.17	0.17	0.17	0.17	0.17	0.68	0.68
PLENTZIA	0	0	0	0	0	14.61	1.28	14.61	28.57	28.57
SESTAO	0	0	0	0.09	0.09	0.09	0.09	0.09	0.09	0.09
VALLE	0	0	0	0	0	0	0	0	0.34	0.34
ZARAUZ	0	0	0	0.09	0	0.09	0.09	0.09	0.09	0.09
ZUMAIA	8.74	9.31	11.02	11.3	13.65	14.5	13.65	14.5	29.78	29.78

ESTIMATED NUMBER OF PEOPLE EMPLOYED IN OTHER ACTIVITIES IN THE SERVICE SECTOR POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	0	0	8	8	8	8	8	8	12	12
BAKIO	0	0	0	0	0	12	0	12	12	12
BARAKALDO	0	0	0	0	0	12	0	12	24	24
BARRIKA	0	0	4	4	8	12	8	16	16	20
BERMEO	0	0	0	0	0	4	0	4	4	4
BILBAO	4	4	179	183	231	280	239	296	464	464
BUSTURIA	0	0	0	0	4	4	4	4	4	4
DEBA	0	0	0	0	64	88	80	92	112	116
DONOSTIA	0	12	8	16	160	168	168	593	375	860
EA	16	16	16	16	16	16	16	16	16	16
ERANDIO	579	579	653	661	806	885	818	893	1085	1150
ERRETERIA	0	0	0	0	0	0	0	0	12	12
GERNIKA-LUMO	0	0	0	0	0	0	0	0	114	114
GETARIA	21	21	21	21	21	21	21	21	21	21
GETXO	0	0	0	0	0	0	0	1050	1186	1230
HONDARRIBIA	32	32	44	44	64	64	64	64	188	216
IRUN	103	103	522	526	622	682	650	714	798	798
LEIOA	0	0	0	0	0	91	0	635	777	781
LEKEITIO	0	0	0	0	0	4	0	4	4	4
ONDARROA	4	12	84	84	88	88	88	120	145	145
ORIO	0	8	132	156	208	224	220	224	244	264
PASAIA	4	4	4	4	4	4	4	4	44	81
PLENTZIA	0	0	36	36	40	52	40	56	72	72
SUKARRIETA	0	0	0	0	0	0	0	0	0	4
VALLE	0	0	0	0	0	0	0	0	28	28
ZUMAIA	8	43	247	263	318	342	326	354	466	470

ESTIMATED PERCENTAGE OF PEOPLE EMPLOYED IN OTHER ACTIVITIES IN THE SERVICE SECTOR POTENTIALLY AFFECTED

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	0	0	3.15	3.15	3.15	3.15	3.15	3.15	4.72	4.72
BAKIO	0	0	0	0	0	5.66	0	5.66	5.66	5.66
BARAKALDO	0	0	0	0	0	0.12	0	0.12	0.24	0.24
BARRIKA	0	0	3.23	3.23	6.45	9.68	6.45	12.9	12.9	16.13
BERMEO	0	0	0	0	0	0.33	0	0.33	0.33	0.33
BILBAO	0	0	0.19	0.19	0.24	0.29	0.25	0.31	0.48	0.48
BUSTURIA	0	0	0	0	6.67	6.67	6.67	6.67	6.67	6.67
DEBA	0	0	0	0	12.52	17.22	15.66	18	21.92	22.7
DONOSTIA	0	0.02	0.01	0.03	0.27	0.28	0.28	0.98	0.62	1.43
EA	66.67	66.67	66.67	66.67	66.67	66.67	66.67	66.67	66.67	66.67
ERANDIO	11.38	11.38	12.83	12.99	15.84	17.39	16.08	17.55	21.32	22.6
ERRETERIA	0	0	0	0	0	0	0	0	0.4	0.4
GERNIKA-LUMO	0	0	0	0	0	0	0	0	6.41	6.41
GETARIA	8.37	8.37	8.37	8.37	8.37	8.37	8.37	8.37	8.37	8.37
GETXO	0	0	0	0	0	0	0	7.46	8.42	8.74
HONDARRIBIA	1.94	1.94	2.67	2.67	3.88	3.88	3.88	3.88	11.39	13.08
IRÚN	1.42	1.42	7.22	7.27	8.6	9.43	8.99	9.87	11.03	11.03
LEIOA	0	0	0	0	0	1.59	0	11.07	13.55	13.62
LEKEITIO	0	0	0	0	0	0.83	0	0.83	0.83	0.83
ONDARROA	0.59	1.78	12.44	12.44	13.04	13.04	13.04	17.78	21.48	21.48
ORIO	0	1.45	23.96	28.31	37.75	40.65	39.93	40.65	44.28	47.91
PASAIA	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	2.96	5.45
PLENTZIA	0	0	7.96	7.96	8.85	11.5	8.85	12.39	15.93	15.93
SUKARRIETA	0	0	0	0	0	0	0	0	0	20
VALLE	0	0	0	0	0	0	0	0	1.5	1.5
ZUMAIA	0.93	4.99	28.65	30.51	36.89	39.68	37.82	41.07	54.06	54.52

RESIDENTIAL AND INDUSTRIAL LAND TABLES (ECONOMIC ACTIVITIES)

HECTARES OF POTENTIALLY AFFECTED RESIDENTIAL LAND

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	0.45	0.46	0.52	0.53	0.6	0.68	0.62	0.69	0.77	0.8
ARRATZU	0	0	0	0	0	0	0	0	0	0
ASTIGARRAGA	0.03	0.03	0.04	0.04	0.05	0.06	0.05	0.06	0.09	0.11
BAKIO	0.74	0.86	0.88	1.07	4.13	6.67	4.68	7.24	10.12	10.94
BARAKALDO	0.45	0.46	1.48	1.53	1.96	2.61	2.08	3.3	5.2	5.57
BARRIKA	0.18	0.23	1.18	1.28	1.69	1.91	1.78	1.94	2.12	2.17
BERMEO	0	0	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.04
BILBAO	11.86	13.09	33.63	36.05	45.8	52.83	47.59	54.18	61.4	62.45
BUSTURIA	0.82	0.84	1.01	1.07	2.69	3.26	2.86	3.37	3.73	3.76
DEBA	0.03	0.04	0.06	0.06	0.81	1.15	0.9	1.4	2.76	2.88
DONOSTIA	2.63	2.81	9.22	9.49	16.63	18.37	17.21	22.29	21.8	25.76
EA	0.81	1.03	0.93	1.18	1.09	1.19	1.29	1.38	1.32	1.51
ELANTXOBE	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09
ERANDIO	10.8	11.52	14.55	15.05	16.9	18.09	17.25	18.45	19.97	20.21
ERRETERIA	0.56	0.58	0.66	0.68	0.74	0.84	0.79	0.86	1.03	1.09
FORUA	0	0	0	0	0	0	0	0	0	0
GAUTEGIZ-ARTEAGA	0	0	0.01	0.02	0.02	0.03	0.03	0.04	0.06	0.07
GERNIKA-LUMO	0.14	0.14	0.16	0.16	0.21	0.62	0.22	0.68	6.07	6.35
GETARIA	0	0	0	0	0	0	0	0	0	0
GETXO	0	0	0	0	0	0.01	0	20.39	24.37	25.14
GORLIZ	0.17	0.17	0.17	0.17	0.17	0.19	0.18	0.19	0.24	0.24
HONDARRIBIA	10.54	10.92	13.56	13.89	15.21	16.22	15.43	16.54	22.78	23.45
IBARRANGELU	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04
IRUN	5.1	5.52	6.7	6.83	7.33	7.87	7.45	8	8.44	8.5
ISPASTER	0	0	0	0	0	0	0	0	0.02	0.02
KORTEZUBI	0	0	0.01	0.01	0.03	0.03	0.03	0.04	0.04	0.05
LEIOA	0.55	0.57	0.68	0.7	0.76	0.82	0.78	1.12	1.94	2.07
LEKEITIO	0.22	0.24	0.3	0.32	0.39	0.48	0.4	0.54	0.74	0.77
LEMOIZ	0.13	0.13	0.14	0.15	0.16	0.17	0.16	0.17	0.17	0.17
LEZO	0	0	0	0	0	0	0	0	0.05	0.05
LOIU	0.09	0.1	0.11	0.11	0.12	0.12	0.12	0.13	0.27	0.3
MENDEXA	0.04	0.04	0.05	0.06	0.07	0.09	0.07	0.09	0.11	0.11
MUNDAKA	0.03	0.04	0.05	0.05	0.06	0.07	0.06	0.07	0.08	0.09
MURUETA	0	0	0.01	0.03	0.13	0.17	0.15	0.17	0.24	0.25
MUSKIZ	0.17	0.18	0.19	0.2	0.22	0.32	0.23	0.37	1.06	1.13
MUTRIKU	0.04	0.04	0.04	0.05	0.05	0.06	0.05	0.06	0.09	0.1
ONDARROA	5.96	6.42	8.99	9.44	10.66	11.31	10.85	11.44	12.06	12.17
ORIO	0.69	0.72	6.96	7.47	9.3	11	9.73	11.36	13.56	13.85
PASAIA	0.58	0.64	0.87	0.92	1.22	1.42	1.27	1.61	2.82	3
PLENTZIA	11.96	12.32	13.83	14.08	15.75	18.45	16.4	18.82	20.35	20.53
PORTUGALETE	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08
SANTURTZI	0	0	0	0	0	0	0	0	0	0
SESTAO	0.39	0.42	1.01	1.78	2.61	3.04	2.72	3.12	3.63	3.71
SOPELA	0	0	0	0	0.01	0.01	0.01	0.01	0.01	0.01
SUKARRIETA	0	0	0	0	0	0.01	0	0.04	0.07	0.07
USURBIL	0.02	0.02	0.03	0.04	0.06	0.09	0.06	0.1	0.24	0.27
ZARAUZ	2.16	2.43	3.33	3.61	4.33	5.37	4.92	5.58	6.49	6.71
ZESTOA	0.11	0.12	0.15	0.16	0.22	0.26	0.23	0.27	0.29	0.3
ZIERBENA	0	0	0	0	0	0	0	0	0.01	0.01
ZUMAIA	2.4	2.95	6.59	7.15	10.17	12.57	10.72	13.16	16.78	17.25

PERCENTAGE OF POTENTIALLY AFFECTED RESIDENTIAL LAND

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	1.4	1.45	1.62	1.66	1.87	2.11	1.95	2.16	2.41	2.49
ARRATZU	0	0	0	0	0	0	0	0	0.01	0.01
ASTIGARRAGA	0.06	0.06	0.08	0.08	0.1	0.11	0.1	0.12	0.19	0.21
BAKIO	0.39	0.45	0.46	0.57	2.17	3.51	2.47	3.81	5.34	5.77
BARAKALDO	0.25	0.26	0.83	0.86	1.1	1.46	1.17	1.85	2.92	3.12
BARRIKA	0.29	0.36	1.89	2.05	2.69	3.05	2.84	3.1	3.4	3.46
BERMEO	0	0	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.04
BILBAO	1.06	1.17	3.01	3.23	4.1	4.73	4.26	4.85	5.5	5.59
BUSTURIA	0.88	0.91	1.08	1.15	2.89	3.51	3.08	3.62	4.01	4.05
DEBA	0.08	0.09	0.14	0.15	2	2.84	2.22	3.47	6.82	7.12
DONOSTIA	0.19	0.2	0.66	0.68	1.2	1.32	1.24	1.6	1.57	1.85
EA	10.39	13.31	11.99	15.15	14.02	15.31	16.64	17.76	17.06	19.45
ELANTXOBE	1.1	1.14	1.14	1.16	1.15	1.17	1.18	1.2	1.18	1.22
ERANDIO	7.55	8.05	10.16	10.52	11.81	12.64	12.05	12.89	13.96	14.12
ERRENTERIA	0.21	0.22	0.25	0.25	0.28	0.32	0.3	0.32	0.39	0.41
FORUA	0	0	0	0	0	0	0	0	0	0
GAUTEGIZ-ARTEAGA	0	0	0.02	0.02	0.03	0.04	0.03	0.04	0.07	0.08
GERNIKA-LUMO	0.12	0.12	0.13	0.14	0.17	0.51	0.18	0.57	5.05	5.29
GETARIA	0	0	0	0	0	0	0	0	0	0.01
GETXO	0	0	0	0	0	0	0	3.11	3.71	3.83
GORLIZ	0.09	0.09	0.09	0.09	0.1	0.1	0.1	0.11	0.13	0.13
HONDARRIBIA	3.3	3.42	4.25	4.35	4.76	5.08	4.83	5.18	7.13	7.34
IBARRANGELU	0.07	0.07	0.07	0.08	0.08	0.09	0.08	0.09	0.1	0.1
IRUN	5.11	5.52	6.71	6.83	7.34	7.88	7.45	8.01	8.45	8.51
ISPASTER	0	0	0	0	0	0.01	0	0.01	0.04	0.04
KORTEZUBI	0	0	0.04	0.05	0.1	0.14	0.11	0.15	0.18	0.18
LEIOA	0.25	0.26	0.31	0.32	0.35	0.37	0.36	0.51	0.88	0.94
LEKEITIO	0.35	0.38	0.49	0.51	0.62	0.77	0.65	0.87	1.2	1.24
LEMOIZ	0.26	0.27	0.29	0.3	0.32	0.33	0.33	0.34	0.35	0.35
LEZO	0	0	0	0	0	0	0	0	0.15	0.16
LOIU	0.11	0.11	0.12	0.12	0.13	0.14	0.13	0.14	0.3	0.34
MENDEXA	0.17	0.18	0.21	0.22	0.26	0.34	0.28	0.36	0.43	0.44
MUNDAKA	0.25	0.27	0.34	0.37	0.42	0.5	0.45	0.52	0.61	0.65
MURUETA	0	0	0.05	0.1	0.52	0.66	0.59	0.68	0.95	0.98
MUSKIZ	0.22	0.23	0.25	0.25	0.28	0.42	0.29	0.47	1.37	1.46
MUTRIKU	0.09	0.09	0.1	0.11	0.11	0.13	0.11	0.14	0.21	0.23
ONDARROA	11.93	12.85	17.98	18.88	21.32	22.63	21.7	22.88	24.13	24.35
ORIO	1.76	1.83	17.77	19.08	23.73	28.09	24.84	29	34.61	35.35
PASAIA	1.07	1.17	1.6	1.69	2.23	2.59	2.31	2.94	5.16	5.48
PLENTZIA	11.49	11.83	13.29	13.53	15.13	17.72	15.76	18.08	19.54	19.72
PORTUGALETE	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
SANTURTZI	0	0	0	0	0	0	0	0	0	0
SESTAO	0.43	0.48	1.14	2	2.94	3.43	3.06	3.52	4.08	4.18
SOPELA	0	0	0	0	0	0	0	0	0.01	0.01
SUKARRIETA	0	0	0	0	0	0.06	0	0.17	0.29	0.31
USURBIL	0.03	0.03	0.04	0.05	0.07	0.12	0.08	0.13	0.33	0.35
ZARAUTZ	1.4	1.57	2.15	2.33	2.8	3.47	3.18	3.61	4.19	4.33
ZESTOA	0.3	0.31	0.4	0.44	0.59	0.69	0.62	0.71	0.78	0.79
ZIERBENA	0	0	0	0	0	0	0	0	0.01	0.01
ZUMAIA	2.91	3.58	8	8.67	12.34	15.25	13	15.97	20.35	20.92

HECTARES OF POTENTIALLY AFFECTED INDUSTRIAL LAND (ECONOMIC ACTIVITIES)

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	3.53	3.99	6.32	6.88	8.3	8.76	8.43	8.85	9.21	9.23
AMOROTO	0.1	0.1	0.11	0.11	0.12	0.13	0.12	0.13	0.14	0.14
ASTIGARRAGA	0.36	0.36	0.4	0.41	0.44	0.48	0.45	0.49	0.53	0.54
BARAKALDO	7.88	8.4	11.42	12.19	16.34	20.89	17.58	22.07	26.24	27.11
BERRIATUA	0.03	0.03	0.03	0.04	0.05	0.06	0.05	0.06	0.08	0.09
BILBAO	0.75	0.8	0.98	1.01	1.36	2.23	1.53	2.49	4.32	4.54
BUSTURIA	0	0	0	0	0	0	0	0	0.01	0.01
DONOSTIA	0.06	0.06	0.06	0.06	0.07	0.08	0.07	0.13	0.28	0.36
ERANDIO	10.18	11.37	18.77	20.51	28.16	38.77	30.34	41.35	52.61	54.46
ERRENTERIA	0	0	0.02	0	0.31	2.67	0.63	3.08	4.34	4.44
FORUA	0	0	0	0	0	0	0	0	0.02	0.04
GETARIA	8.82	9.09	8.98	9.19	9.14	9.2	9.27	9.32	9.29	9.4
GETXO	0.84	0.88	0.97	1	1.16	1.89	1.25	2.02	3.66	4.04
HONDARRIBIA	2.52	2.6	2.85	2.92	3.18	3.29	3.21	3.31	3.51	3.53
IRUN	0.97	1.15	1.55	1.63	1.93	2.06	1.99	2.07	2.14	3.9
LEIOA	0.73	0.77	0.91	1.06	1.57	11.95	1.67	17.07	25.97	27.68
LEMOIZ	1.19	1.21	1.25	1.27	1.31	1.38	1.35	1.4	1.46	1.47
LEZO	0	0	0	0	0	0.93	0.02	1.33	3.93	4.1
LOIU	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
MUNDAKA	0.39	0.4	0.42	0.43	0.45	0.52	0.47	1.7	2.97	3.12
MURUETA	1.3	1.61	2.85	2.98	3.26	3.42	3.31	3.44	3.46	3.46
MUSKIZ	6.25	6.29	6.57	6.69	7.07	7.43	7.18	7.54	7.94	8.01
MUTRIKU	0.57	0.58	0.64	0.65	0.76	1	0.79	1.09	1.5	1.54
ONDARROA	0.29	0.3	0.38	0.41	0.9	1.05	0.95	1.09	1.37	1.42
ORIO	0.32	0.34	0.95	1.04	1.28	1.4	1.31	1.43	1.52	1.54
SESTAO	1.23	1.31	10.96	11.25	12.9	16.96	13.47	18.65	24.94	26.41
SONDIKA	0.3	0.31	0.35	0.36	0.41	0.51	0.43	0.55	0.86	0.93
USURBIL	0	0	0	0	0	0.01	0.01	0.01	0.04	0.05
VALLE	0	0	9.18	9.7	11.15	13.64	11.37	15	34.7	37.79
ZARAUTZ	0.67	0.69	0.8	0.84	1.13	1.27	1.16	1.3	1.45	1.48
ZUMAIA	4.62	6.75	9.16	10.79	13.41	15.58	14.09	16.11	19.13	19.46

PERCENTAGE OF POTENTIALLY AFFECTED INDUSTRIAL LAND (ECONOMIC ACTIVITIES)

MUNICIPALITIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
AIA	9.72	10.99	17.42	18.96	22.87	24.14	23.22	24.38	25.35	25.42
AMOROTO	2.75	2.8	3.09	3.15	3.37	3.57	3.42	3.6	3.88	3.95
ASTIGARRAGA	0.43	0.44	0.49	0.5	0.53	0.58	0.54	0.59	0.65	0.65
BARAKALDO	4	4.26	5.79	6.18	8.29	10.59	8.91	11.19	13.3	13.75
BERRIATUA	0.17	0.18	0.21	0.22	0.27	0.36	0.3	0.38	0.5	0.55
BILBAO	0.91	0.98	1.19	1.24	1.66	2.72	1.86	3.04	5.27	5.54
BUSTURIA	0.12	0.12	0.14	0.14	0.25	0.54	0.26	0.75	1.3	1.32
DONOSTIA	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.08	0.1
ERANDIO	5.11	5.71	9.42	10.3	14.14	19.46	15.23	20.76	26.41	27.34
ERRENTERIA	0	0	0.03	0	0.35	2.98	0.7	3.44	4.85	4.96
FORUA	0	0	0	0	0	0	0	0	1	2
GETARIA	38.17	39.36	38.85	39.79	39.55	39.84	40.11	40.33	40.22	40.71
GETXO	5.78	6.07	6.7	6.9	7.97	13.01	8.6	13.94	25.25	27.84
HONDARRIBIA	7.02	7.22	7.92	8.12	8.83	9.14	8.92	9.19	9.74	9.8
IRUN	0.39	0.46	0.63	0.66	0.78	0.83	0.8	0.84	0.86	1.57
LEIOA	0.53	0.56	0.66	0.77	1.14	8.72	1.21	12.44	18.93	20.18
LEMOIZ	2.82	2.85	2.96	3.01	3.11	3.26	3.19	3.31	3.45	3.47
LEZO	0	0	0	0	0	1.59	0.03	2.27	6.69	6.99
LOIU	0	0	0	0	0	0	0	0.01	0.01	0.01
MUNDAKA	2.38	2.44	2.55	2.61	2.77	3.2	2.86	10.43	18.19	19.08
MURUETA	31.81	39.31	69.8	72.94	79.83	83.68	80.98	84.2	84.7	84.73
MUSKIZ	3.41	3.43	3.58	3.65	3.85	4.05	3.91	4.11	4.33	4.36
MUTRIKU	3.49	3.57	3.95	4	4.65	6.12	4.86	6.7	9.21	9.46
ONDARROA	2.51	2.55	3.25	3.5	7.66	8.98	8.11	9.32	11.67	12.1
ORIO	1.58	1.64	4.66	5.06	6.23	6.85	6.41	6.99	7.44	7.52
SESTAO	1.21	1.3	10.83	11.12	12.75	16.76	13.31	18.43	24.65	26.1
SONDIKA	0.54	0.57	0.64	0.66	0.75	0.93	0.79	1	1.57	1.71
USURBIL	0	0	0	0	0	0.01	0.01	0.02	0.05	0.06
VALLE	0	0	5.88	6.21	7.14	8.73	7.28	9.6	22.21	24.19
ZARAUTZ	1.17	1.2	1.41	1.47	1.97	2.23	2.04	2.28	2.54	2.59
ZUMAIA	7.27	10.63	14.42	16.97	21.1	24.51	22.17	25.35	30.1	30.61

TABLES IDENTIFYING CRITICAL SUBSYSTEMS

LIST OF CRITICAL POINT-TYPE SUBSYSTEMS POTENTIALLY AFFECTED BY FLOODING.
COORDINATES ARE ETRS / UTM (METRES) ZONE 30

INFRASTRUCTURE	CLIMATE SCENARIOS											
	X	Y	1	2	3	4	5	6	7	8	9	10
Clínica IMQ Zorrotzaurre	503,890	4,790,561										x
Ea WWTP	533,736	4,803,373		x		x	x	x	x	x	x	x
Gernika WWTP	526,407	4,796,855					x	x	x	x	x	x
Waste Air BEFESA ZINC ASER,S,A,	504,107	4,794,244								x	x	x
Waste Air BILBAINA ALQUITRANES	502,166	4,792,608						x		x	x	x
Waste Air FAES FARMA	499,620	4,796,425						x		x	x	x
Waste Air INDUMETAL RECYCLING S.A.	504,179	4,793,987									x	x
Air waste PRODUCTOS TUBULARES (CENTRO DE ACERÍA),	498,934	4,793,919									x	x
Waste Air RECUBRIMIENTOS IREKI	498,929	4,794,171									x	x
Air waste Vidriería y Cristalería de Lamiaco, S.A.	499,471	4,796,292						x		x	x	x
Babcock Wilcox Transformer Substation	499,861	4,794,644						x		x	x	x
Substation	501,012	4,795,100					x	x	x	x	x	x

LIST OF CRITICAL LINE-TYPE SUBSYSTEMS POTENTIALLY AFFECTED IN EACH FLOOD CLIMATE SCENARIO. ONLY STRETCHES LONGER THAN 200 M ARE SHOWN:

SCENARIO 1.

Name	x ini, (m)	y ini, (m)	x fin. (m)	y fin. (m)	Length (m)
Bilbao Tram Line	502,105	4,794,394	502,026	4,794,811	424
Bilbao Tram Line	502,023	4,794,810	502,098	4,794,410	407
Main roads N-638	596,560	4,800,213	596,788	4,800,272	236
Main roads GI-3161	570,594	4,791,314	570,412	4,791,197	216

SCENARIO 2.

Name	x ini, (m)	y ini, (m)	x fin. (m)	y fin. (m)	Length (m)
Bilbao Tram Line	502,107	4,794,383	502,026	4,794,811	435
Bilbao Tram Line	502,023	4,794,810	502,098	4,794,410	407
Main roads N-638	596,560	4,800,213	596,788	4,800,272	236
Main roads GI-3161	570,595	4,791,314	570,412	4,791,197	217

SCENARIO 3.

Name	x ini, (m)	y ini, (m)	x fin. (m)	y fin. (m)	Length (m)
Bilbao Tram Line	502,023	4,794,810	502,107	4,794,364	453
Bilbao Tram Line	502,110	4,794,365	502,026	4,794,811	453
Main roads GI-636	598,447	4,799,615	598,772	4,799,405	387
Bilbao-Bermeo Railway	526,855	4,798,534	526,915	4,798,884	355
Bilbao-Bermeo Railway	526,913	4,799,290	526,717	4,799,548	324
Main roads N-638	596,560	4,800,213	596,788	4,800,272	236
Main roads GI-3161	570,601	4,791,319	570,412	4,791,197	225

SCENARIO 4.

Name	x ini. (m)	y ini. (m)	x fin. (m)	y fin. (m)	Length (m)
Bilbao-Bermeo Railway	526,919	4,799,280	526,560	4,799,751	592
Bilbao Tram Line	502,110	4,794,364	502,026	4,794,811	454
Bilbao Tram Line	502,023	4,794,810	502,107	4,794,364	453
Bilbao-Bermeo Railway	526,854	4,798,532	526,926	4,798,947	421
Main roads GI-636	598,447	4,799,615	598,772	4,799,405	387
Main roads BI-711	502,161	4,793,654	502,040	4,793,873	249
Main roads N-638	596,560	4,800,213	596,788	4,800,272	236
Main roads GI-3161	570,602	4,791,320	570,412	4,791,197	227

SCENARIO 5.

Name	x ini. (m)	y ini. (m)	x fin. (m)	y fin. (m)	Length (m)
Bilbao-Bermeo Railway	526,840	4,798,460	526,296	4,800,092	1859
Bilbao Tram Line	502,113	4,794,302	502,026	4,794,811	517
Bilbao Tram Line	502,023	4,794,810	502,110	4,794,302	516
Main roads GI-636	598,447	4,799,615	598,772	4,799,405	387
La Naval-Sestao Rail Network	500,987	4,795,078	501,297	4,794,990	335
Bilbao-Bermeo Railway	526,508	4,797,829	526,660	4,798,104	313
Main roads BI-711	502,161	4,793,654	502,012	4,793,920	303
Bilbao-Bermeo Railway	526,669	4,798,120	526,790	4,798,338	249
Main roads N-638	596,560	4,800,213	596,788	4,800,272	236
Main roads GI-3161	570,607	4,791,326	570,412	4,791,197	235
Bilbao-Donostia Railway (Euskotren)	552,252	4,793,529	552,283	4,793,750	223
Lutxana-Sondika Railway	504,770	4,794,163	504,551	4,794,166	219
Main roads GI-636	600,017	4,799,552	600,228	4,799,602	217
Lutxana-Sondika Railway	503,101	4,794,162	502,942	4,794,028	212
Bilbao Tram Line	501,983	4,795,018	502,023	4,794,810	211
Bilbao Tram Line	502,026	4,794,811	501,987	4,795,016	208
Bilbao-Donostia Railway (Euskotren)	552,259	4,793,540	552,284	4,793,746	207
Alonsotegi-Burtzeña Railway	502,082	4,792,474	502,255	4,792,462	203

SCENARIO 6.

Name	x ini. (m)	y ini. (m)	x fin. (m)	y fin. (m)	Length (m)
Bilbao-Bermeo Railway	526,840	4,798,458	526,260	4,800,139	1921
Bilbao-Bermeo Railway	526,258	4,800,141	525,924	4,800,604	572
Bilbao Tram Line	502,113	4,794,302	502,026	4,794,811	517
Bilbao Tram Line	502,023	4,794,810	502,110	4,794,302	516
La Naval-Sestao Rail Network	500,987	4,795,078	501,378	4,795,110	481
Main roads BI-711	502,161	4,793,654	501,961	4,794,048	442
Main roads GI-636	598,447	4,799,615	598,772	4,799,405	387
Lutxana-Sondika Railway	504,798	4,794,163	504,477	4,794,190	325
Bilbao-Santurtzi Railway	501,981	4,792,552	502,012	4,792,874	322
Bilbao-Bermeo Railway	526,508	4,797,828	526,660	4,798,104	314
Port of Pasaia Rail Network	588,992	4,797,311	588,697	4,797,334	309
Lutxana-Sondika Railway	503,150	4,794,180	502,921	4,793,999	300
Main roads BI-2122	504,310	4,805,463	504,037	4,805,576	295
Lutxana-Sondika Railway	504,103	4,794,391	503,839	4,794,440	273
Lutxana-Sondika Railway	504,450	4,794,204	504,214	4,794,332	268
Main roads GI-636	599,971	4,799,544	600,228	4,799,602	263
Bilbao-Bermeo Railway	526,669	4,798,120	526,795	4,798,348	259
Main roads GI-3161	570,610	4,791,332	570,412	4,791,197	241
Main roads N-638	596,560	4,800,213	596,788	4,800,272	236
Bilbao-Donostia Railway (Euskotren)	552,252	4,793,529	552,285	4,793,764	236
Main roads BI-711	500,823	4,795,777	501,032	4,795,668	235
Main roads N-634	560,148	4,793,256	560,085	4,793,034	230
Bilbao-Donostia Railway	552,259	4,793,540	552,285	4,793,764	226
Bilbao-Muskiz Railway	501,988	4,792,649	502,009	4,792,873	225
Bilbao Tram Line	501,981	4,795,030	502,023	4,794,810	223
Main roads BI-735	503,859	4,794,567	504,078	4,794,550	221
Bilbao Tram Line	502,026	4,794,811	501,984	4,795,028	220
Port of Pasaia Rail Network	587,471	4,797,120	587,658	4,797,015	214
Main roads BI-711	499,959	4,796,074	500,161	4,796,006	213
Main roads BI-735	503,869	4,794,580	504,078	4,794,550	213
Alonsotegi-Burtzeña Railway	502,082	4,792,474	502,255	4,792,462	203
La Naval-Sestao Rail Network	500,805	4,795,166	500,987	4,795,078	203

SCENARIO 7

Name	x ini. (m)	y ini. (m)	x fin. (m)	y fin. (m)	Length (m)
Bilbao-Bermeo Railway	526,840	4.798460	526,260	4,800,139	1919
Bilbao Tram Line	502,113	4.794302	502,026	4,794,811	517
Bilbao Tram Line	502,023	4.794810	502,110	4,794,302	516
Main roads GI-636	598,447	4.799615	598,772	4,799,405	387
La Naval-Sestao Rail Network	500,987	4.795078	501,302	4,794,992	341
Main roads BI-711	502,161	4.793654	502,006	4,793,930	316
Bilbao-Bermeo Railway	526,508	4.797829	526,660	4,798,104	313
Bilbao-Bermeo Railway	526,669	4.798120	526,790	4,798,339	250
Main roads N-638	596,560	4.800213	596,788	4,800,272	236
Bilbao-Donostia Railway (Euskotren)	552,252	4.793529	552,285	4,793,764	236
Main roads GI-3161	570,607	4.791326	570,412	4,791,197	235
Lutxana-Sondika Railway	504,421	4.794220	504,214	4,794,332	234
Lutxana-Sondika Railway	503,111	4.794166	502,936	4,794,020	233
Lutxana-Sondika Railway	504,779	4.794163	504,546	4,794,167	233
Main roads GI-636	600,005	4.799550	600,228	4,799,602	229
Bilbao-Donostia Railway (Euskotren)	552,259	4.793540	552,285	4,793,764	226
Bilbao Tram Line	502,026	4.794811	501,986	4,795,022	214
Bilbao Tram Line	501,983	4.795020	502,023	4,794,810	212
Bilbao-Bermeo Railway	526,252	4.800149	526,122	4,800,316	211
Alonsotegi-Burtzeña Railway	502,082	4.792474	502,255	4,792,462	203

SCENARIO 8.

Name	x ini. (m)	y ini. (m)	x fin. (m)	y fin. (m)	Length (m)
Bilbao-Bermeo Railway	526,839	4,798,456	526,260	4,800,139	1,923
Bilbao-Bermeo Railway	526,258	4,800,141	525,890	4,800,666	641
Motorways and dual carriageways BI-644	499,914	4,794,159	499,982	4,794,736	597
Bilbao Tram Line	502,113	4,794,302	502,026	4,794,811	517
Bilbao Tram Line	502,023	4,794,810	502,110	4,794,302	516
La Naval-Sestao Rail Network	500,987	4,795,078	501,378	4,795,110	481
Motorways and dual carriageways BI-644	500,002	4,794,614	499,904	4,794,164	464
Port of Pasaia Rail Network	587,419	4,797,129	587,827	4,796,922	461
Main roads BI-711	502,161	4,793,654	501,961	4,794,048	442
Motorways and dual carriageways BI-644	499,492	4,793,582	499,764	4,793,870	396
Main roads GI-636	598,447	4,799,615	598,772	4,799,405	387
Bilbao-Santurtzi Railway: Bilbao-Santurtzi	501,976	4,792,516	502,013	4,792,892	378
Motorways and dual carriageways BI-644	499,741	4,793,857	499,481	4,793,585	376
Lutxana-Sondika Railway	503,175	4,794,190	502,917	4,793,994	334
Lutxana-Sondika Railway	504,802	4,794,163	504,477	4,794,190	329
Bilbao-Bermeo Railway	526,508	4,797,828	526,660	4,798,104	314
Port of Pasaia Rail Network	588,992	4,797,311	588,697	4,797,334	309
Bilbao-Bermeo Railway	525,613	4,801,112	525,408	4,801,339	309
Main roads BI-2122	504,310	4,805,463	504,037	4,805,576	295
Bilbao-Bermeo Railway	526,669	4,798,120	526,808	4,798,374	290
Main roads GI-636	599,948	4,799,540	600,228	4,799,602	287
Main roads BI-711	501,532	4,795,472	501,747	4,795,294	279
Lutxana-Sondika Railway	504,456	4,794,202	504,214	4,794,332	274
Lutxana-Sondika Railway	504,103	4,794,391	503,838	4,794,440	274
Main roads GI-2137	584,058	4,795,180	584,299	4,795,068	265
Bilbao-Muskiz Railway	501,988	4,792,649	502,009	4,792,892	244
Lutxana-Sondika Railway	503,821	4,794,436	503,594	4,794,353	242
Main roads GI-3161	570,610	4,791,332	570,412	4,791,197	241
Main roads BI-711	499,947	4,796,078	500,175	4,796,000	240
Main roads N-638	596,560	4,800,213	596,788	4,800,272	236
Bilbao-Donostia Railway: Bilbao-San Sebastian	552,252	4,793,529	552,285	4,793,764	236
Main roads BI-711	500,823	4,795,777	501,032	4,795,668	235
Main roads N-634	560,148	4,793,256	560,085	4,793,034	230
La Naval-Sestao Rail Network	500,780	4,795,175	500,987	4,795,078	230
Bilbao Tram Line	501,980	4,795,034	502,023	4,794,810	227
Bilbao-Donostia Railway (Euskotren)	552,259	4,793,540	552,285	4,793,764	226
Bilbao Tram Line	502,026	4,794,811	501,984	4,795,030	222
Main roads BI-735	503,859	4,794,567	504,078	4,794,550	221
Main roads BI-735	503,869	4,794,580	504,078	4,794,550	213
Alonsotegi-Burtzeña Railway	502,082	4,792,474	502,255	4,792,462	203

SCENARIO 9.

Name	x ini. (m)	y ini. (m)	x fin. (m)	y fin. (m)	Length (m)
Bilbao-Bermeo Railway	526,669	4,798,120	526,260	4,800,139	2,300
Port of Pasaia Rail Network	587,372	4,797,128	588,407	4,796,832	1,120
Bilbao-Bermeo Railway	526,258	4,800,141	525,749	4,800,934	945
Bilbao-Santurtzi Railway: Bilbao-Santurtzi	501,944	4,792,245	502,013	4,792,904	662
Lutxana-Sondika Railway	504,832	4,794,163	504,214	4,794,332	658
Motorways and dual carriageways BI-644	499,914	4,794,159	499,982	4,794,736	597
Main roads BI-711	499,729	4,796,152	500,253	4,795,974	554
Main roads GI-636	599,701	4,799,502	600,228	4,799,602	536
Lutxana-Sondika Railway	504,103	4,794,391	503,594	4,794,353	534
Bilbao Tram Line	502,113	4,794,302	502,026	4,794,811	517
Bilbao Tram Line	502,023	4,794,810	502,110	4,794,302	516
La Naval-Sestao Rail Network	500,987	4,795,078	501,378	4,795,110	481
Lutxana-Sondika Railway	503,239	4,794,216	502,875	4,793,938	472
Motorways and dual carriageways BI-644	500,002	4,794,614	499,904	4,794,164	464
Port of Pasaia Rail Network	589,049	4,797,310	588,636	4,797,381	449
Bilbao Tram Line	500,215	4,796,362	500,613	4,796,170	444
Main roads BI-711	502,161	4,793,654	501,961	4,794,048	442
Bilbao Tram Line	500,616	4,796,172	500,224	4,796,362	438
La Naval-Sestao Rail Network	500,589	4,795,240	500,987	4,795,078	432
Bilbao-Bermeo Railway	526,206	4,796,443	526,204	4,796,858	415
Bilbao-Bermeo Railway	525,644	4,801,090	525,361	4,801,384	412
Bilbao-Muskiz Railway	501,940	4,792,241	501,988	4,792,649	410
Bilbao-Bermeo Railway	526,306	4,797,464	526,503	4,797,820	406
Bilbao Tram Line	501,922	4,795,195	502,023	4,794,810	400
Motorways and dual carriageways BI-644	499,492	4,793,582	499,764	4,793,870	396
Bilbao Tram Line	502,026	4,794,811	501,929	4,795,192	395
Main roads BI-711	501,439	4,795,529	501,749	4,795,292	391
Main roads GI-636	598,447	4,799,615	598,772	4,799,405	387
Motorways and dual carriageways BI-644	499,741	4,793,857	499,481	4,793,585	376
Bilbao-Bermeo Railway	526,204	4,796,864	526,203	4,797,227	363
Port of Pasaia Rail Network	588,212	4,796,693	588,523	4,796,866	359
Port of Pasaia Rail Network	588,800	4,796,881	589,062	4,797,013	356
Port of Pasaia Rail Network	588,115	4,796,700	588,407	4,796,832	342
Bilbao-Bermeo Railway	526,504	4,797,821	526,660	4,798,104	322
Madrid-Irún Railway: Madrid-Irún	587,768	4,796,882	587,494	4,797,039	316
Port of Pasaia Rail Network	588,993	4,797,310	588,697	4,797,334	310
Bilbao-Bermeo Railway	525,106	4,801,651	525,041	4,801,948	304
Bilbao-Muskiz Railway	501,977	4,792,584	501,938	4,792,288	297
Main roads BI-2122	504,310	4,805,463	504,037	4,805,576	295
Bilbao-Muskiz Railway: Bilbao-Muskiz Railway	501,988	4,792,649	502,011	4,792,943	295
Port of Pasaia Rail Network	588,407	4,796,832	588,558	4,797,077	287
Main roads GI-2137	584,058	4,795,180	584,299	4,795,068	265
Bilbao-Muskiz Railway	501,977	4,792,584	501,944	4,792,336	249
Main roads GI-3161	570,612	4,791,336	570,412	4,791,197	245
Main roads GI-636	599,292	4,799,477	599,536	4,799,483	244
Main roads N-638	596,560	4,800,213	596,788	4,800,272	236
Port of Pasaia Rail Network	587,145	4,797,082	587,372	4,797,128	236
Bilbao-Donostia Railway (Euskotren)	552,252	4,793,529	552,285	4,793,764	236
Main roads BI-711	500,823	4,795,777	501,032	4,795,668	235
Main roads N-634	560,148	4,793,256	560,085	4,793,034	230
Main roads BI-711	499,729	4,796,152	499,515	4,796,234	229
Bilbao-Donostia Railway (Euskotren)	552,259	4,793,540	552,285	4,793,764	226
Madrid-Irún Railway: Madrid-Irún	587,734	4,796,897	587,539	4,797,006	223
Main roads BI-735	503,859	4,794,567	504,078	4,794,550	221
Bilbao-Bermeo Railway	525,358	4,801,387	525,194	4,801,532	219
Main roads BI-735	503,869	4,794,580	504,078	4,794,550	213
Bilbao-Bermeo Railway	524,795	4,802,776	524,842	4,802,978	207
Main roads BI-711	500,284	4,795,964	500,480	4,795,898	206
Alonsotegi-Burtzeña Railway	502,082	4,792,474	502,255	4,792,462	203

SCENARIO 10.

Name	x ini. (m)	y ini. (m)	x fin. (m)	y fin. (m)	Length (m)
Bilbao-Bermeo Railway	526,669	4,798,120	526,260	4,800,139	2,300
Bilbao-Bermeo Railway	526,258	4,800,141	525,360	4,801,386	1,552
Port of Pasaia Rail Network	587,372	4,797,128	588,407	4,796,832	1,120
Main roads BI-711	499,729	4,796,152	500,480	4,795,898	792
Bilbao-Santurtzi Railway: Bilbao-Santurtzi	501,944	4,792,245	502,013	4,792,904	662
Lutxana-Sondika Railway	504,834	4,794,163	504,214	4,794,332	660
Motorways and dual carriageways BI-644	499,914	4,794,159	499,982	4,794,736	597
Main roads GI-636	599,701	4,799,502	600,228	4,799,602	536
Lutxana-Sondika Railway	504,103	4,794,391	503,594	4,794,353	534
Bilbao Tram Line	502,113	4,794,302	502,026	4,794,811	517
Bilbao Tram Line	502,023	4,794,810	502,110	4,794,302	516
Bilbao Tram Line	500,618	4,796,170	500,170	4,796,383	498
Bilbao Tram Line	500,168	4,796,380	500,615	4,796,168	498
Lutxana-Sondika Railway	503,247	4,794,218	502,875	4,793,938	481
La Naval-Sestao Rail Network	500,987	4,795,078	501,378	4,795,110	481
Port of Pasaia Rail Network	589,059	4,797,295	588,636	4,797,381	467
Motorways and dual carriageways BI-644	500,002	4,794,614	499,904	4,794,164	464
Port of Pasaia Rail Network	589,078	4,797,208	588,697	4,797,334	445
Main roads BI-711	502,161	4,793,654	501,961	4,794,048	442
La Naval-Sestao Rail Network	500,581	4,795,241	500,987	4,795,078	440
Bilbao-Bermeo Railway	526,206	4,796,443	526,204	4,796,858	415
Bilbao-Muskiz Railway	501,940	4,792,241	501,988	4,792,649	410
Bilbao-Bermeo Railway	526,306	4,797,464	526,503	4,797,820	406
Bilbao Tram Line	501,922	4,795,195	502,023	4,794,810	400
Motorways and dual carriageways BI-644	499,492	4,793,582	499,764	4,793,870	396
Bilbao Tram Line	502,026	4,794,811	501,929	4,795,192	395
Main roads BI-711	501,439	4,795,529	501,749	4,795,292	391
Main roads GI-636	598,447	4,799,615	598,772	4,799,405	387
Motorways and dual carriageways BI-644	499,741	4,793,857	499,481	4,793,585	376
Bilbao-Bermeo Railway	526,204	4,796,864	526,203	4,797,228	364
Port of Pasaia Rail Network	588,212	4,796,693	588,523	4,796,866	359
Port of Pasaia Rail Network	588,800	4,796,881	589,062	4,797,013	356
Madrid-Irún Railway: Madrid-Irún	587,797	4,796,866	587,494	4,797,039	349
Port of Pasaia Rail Network	588,115	4,796,700	588,407	4,796,832	342
Bilbao-Bermeo Railway	526,504	4,797,821	526,660	4,798,104	322
Bilbao-Bermeo Railway	525,106	4,801,651	525,041	4,801,948	304
Bilbao-Muskiz Railway	501,977	4,792,584	501,938	4,792,288	297
Bilbao-Muskiz Railway	501,977	4,792,584	501,938	4,792,288	297
Main roads BI-2122	504,310	4,805,463	504,037	4,805,576	295
Bilbao-Muskiz Railway	501,988	4,792,649	502,011	4,792,943	295
Port of Pasaia Rail Network	588,407	4,796,832	588,558	4,797,077	287
Main roads GI-2137	584,058	4,795,180	584,299	4,795,068	265
Bilbao-Bermeo Railway	524,797	4,802,722	524,842	4,802,978	262
Madrid-Irún Railway: Madrid-Irún	587,757	4,796,884	587,539	4,797,006	249
Bilbao Tram Line	505,773	4,790,400	505,614	4,790,590	249
Main roads GI-3161	570,612	4,791,336	570,412	4,791,197	245
Main roads GI-636	599,292	4,799,477	599,536	4,799,483	245
Main roads N-638	596,560	4,800,213	596,788	4,800,272	236
Port of Pasaia Rail Network	587,145	4,797,082	587,372	4,797,128	236
Bilbao-Donostia Railway: Bilbao-San Sebastian	552,252	4,793,529	552,285	4,793,764	236
Main roads BI-711	500,823	4,795,777	501,032	4,795,668	235
Main roads N-634	560,148	4,793,256	560,085	4,793,034	230
Main roads BI-711	499,729	4,796,152	499,515	4,796,234	229
Bilbao-Donostia Railway (Euskotren)	552,259	4,793,540	552,285	4,793,764	226
Bilbao-Bermeo Railway	525,358	4,801,387	525,192	4,801,534	222
Main roads BI-735	503,859	4,794,567	504,078	4,794,550	221
Main roads BI-735	503,869	4,794,580	504,078	4,794,550	213
Alonsotegi-Burtzeña Railway	502,082	4,792,474	502,255	4,792,462	203

TABLES OF FAUN AND FLORA

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF PROTECTED FAUNA SPECIES, IN AREAS OF NATURAL SPACES PROTECTED BY REGIONAL REGULATIONS.

SPECIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
<i>Hydrobates pelagicus</i>	0.66	0.67	0.66	0.68	0.67	0.68	0.68	0.69	0.68	0.7
<i>Mustela lutreola</i>	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
<i>Phalacrocorax aristotelis</i>	0.66	0.67	0.67	0.68	0.67	0.68	0.68	0.69	0.69	0.7

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF PROTECTED FAUNA SPECIES, IN AREAS OF THE NATURA NETWORK.

SPECIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
<i>Gasterosteus aculeatus</i>	15.17	15.35	16.11	16.29	16.88	17.37	17.01	17.49	18.08	18.18
<i>Hydrobates pelagicus</i>	1.93	1.96	1.98	2	2.02	2.04	2.04	2.06	2.08	2.1
<i>Hyla meridionalis</i>	0.2	0.21	0.24	0.25	0.29	0.31	0.29	0.32	0.36	0.37
<i>Mustela lutreola</i>	462.16	487.1	504.79	508.42	525.4	536.75	528.48	539.08	549.46	551.17
<i>Phalacrocorax aristotelis</i>	1.94	1.97	1.99	2.01	2.03	2.05	2.05	2.08	2.09	2.11

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF PROTECTED FAUNA SPECIES, IN BIOSPHERE RESERVE AREAS.

SPECIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
<i>Mustela lutreola</i>	412.08	436.88	453.78	457.25	473.37	484.28	476.4	486.49	496.46	498.13
<i>Phalacrocorax aristotelis</i>	0.29	0.29	0.3	0.3	0.31	0.32	0.32	0.32	0.33	0.33
<i>Hydrobates pelagicus</i>	0.29	0.29	0.3	0.3	0.31	0.32	0.32	0.32	0.33	0.33

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF PROTECTED FAUNA SPECIES, IN RAMSAR AREAS.

SPECIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
<i>Gasterosteus aculeatus</i>	8.99	9.1	9.56	9.67	10.05	10.38	10.13	10.47	10.9	10.98
<i>Mustela lutreola</i>	377.89	392.83	405.35	408.14	419.38	427.09	421.5	428.74	436.1	437.28

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF PROTECTED FAUNA SPECIES, IN AREAS OF TRANSITIONAL WATER BODIES.

SPECIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
<i>Gasterosteus aculeatus</i>	1.75	1.76	1.77	1.77	1.79	1.79	1.79	1.79	1.8	1.8
<i>Hyla meridionalis</i>	0.14	0.14	0.15	0.15	0.16	0.16	0.16	0.17	0.19	0.2
<i>Mustela lutreola</i>	396.27	419.03	428.17	429.7	436.62	440.98	437.9	441.89	446.23	446.97

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF FLORA SPECIES WITH AN APPROVED MANAGEMENT PLAN, IN NATURAL SPACES PROTECTED BY REGIONAL LEGISLATION.

SPECIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
10377 <i>Olea europaea var. sylvestris</i>	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
11616 <i>Chamaesyce peplis</i>	0.53	0.54	0.56	0.57	0.61	0.62	0.61	0.62	0.62	0.62
11650 <i>Medicago marina</i>	0.71	0.76	1.03	1.14	1.54	1.74	1.63	1.77	1.9	1.92
12157 <i>Limonium humile</i>	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.92	0.92	0.92
12346 <i>Galium arenarium</i>	0.71	0.76	1.03	1.14	1.54	1.74	1.63	1.77	1.9	1.92
12898 <i>Festuca vasconensis</i>	0.71	0.76	1.03	1.14	1.54	1.74	1.63	1.77	1.9	1.92
14163 <i>Alyssum loiseleurii</i>	0.71	0.76	1.03	1.14	1.54	1.74	1.63	1.77	1.9	1.92
16249 <i>Sonchus maritimus</i>	0.07	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.1	0.1
16625 <i>Solidago virgaurea ssp. m</i>	0.71	0.76	1.03	1.14	1.54	1.74	1.63	1.77	1.9	1.92

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF FLORA SPECIES WITH AN APPROVED MANAGEMENT PLAN, IN AREAS OF THE NATURA NETWORK.

SPECIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
10377 <i>Olea europaea var. sylvestris</i>	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
10658 <i>Culcita macrocarpa</i>	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
11616 <i>Chamaesyce peplis</i>	1.81	1.96	2.85	3.12	4.41	5.22	4.62	5.35	6.04	6.12
11650 <i>Medicago marina</i>	0.72	0.77	1.04	1.15	1.56	1.77	1.64	1.8	2	2.04
12157 <i>Limonium humile</i>	3.32	3.34	3.39	3.4	3.45	3.49	3.46	3.5	3.54	3.55
12346 <i>Galium arenarium</i>	0.72	0.77	1.04	1.15	1.56	1.77	1.64	1.8	2	2.04
12781 <i>Barlia robertiana</i>	0.02	0.02	0.03	0.03	0.04	0.05	0.04	0.06	0.07	0.07
12898 <i>Festuca vasconensis</i>	0.72	0.77	1.04	1.15	1.56	1.77	1.64	1.8	2	2.04
13095 <i>Zostera noltii</i>	327.1	327.2	327.4	327.4	327.5	327.6	327.5	327.6	327.7	327.7
14163 <i>Alyssum loiseleurii</i>	0.72	0.77	1.04	1.15	1.56	1.77	1.64	1.8	2	2.04
16249 <i>Sonchus maritimus</i>	0.07	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.1	0.1
16260 <i>Matricaria maritima</i>	0.21	0.21	0.23	0.23	0.25	0.26	0.26	0.26	0.27	0.28
16625 <i>Solidago virgaurea ssp. m</i>	0.72	0.77	1.04	1.15	1.56	1.77	1.64	1.8	2	2.04

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF FLORA SPECIES WITH AN APPROVED MANAGEMENT PLAN, IN BIOSPHERE RESERVE AREAS.

SPECIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
10377 <i>Olea europaea</i> var. <i>sylvestris</i>	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
11616 <i>Chamaesyce peplis</i>	0.58	0.64	1.03	1.15	1.71	2.02	1.79	2.06	2.27	2.29
11650 <i>Medicago marina</i>	0	0	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.05
12346 <i>Galium arenarium</i>	0	0	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.05
12898 <i>Festuca vasconensis</i>	0	0	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.05
13095 <i>Zostera noltii</i>	145.9	145.9	146.0	146.0	146.0	146.1	146.03	146.1	146.1	146.1
14163 <i>Alyssum loiseleurii</i>	0	0	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.05
16260 <i>Matricaria maritima</i>	0.07	0.07	0.08	0.08	0.09	0.1	0.1	0.1	0.11	0.11
16625 <i>Solidago virgaurea</i> ssp, m	0	0	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.05

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF FLORA SPECIES WITH AN APPROVED MANAGEMENT PLAN, IN RAMSAR AREAS.

SPECIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
10377 <i>Olea europaea</i> var. <i>sylvestris</i>	0.98	1.09	1.84	2.07	3.17	3.78	3.33	3.87	4.27	4.33
11616 <i>Chamaesyce peplis</i>	0	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.07	0.08
11650 <i>Medicago marina</i>	0	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.07	0.08
12346 <i>Galium arenarium</i>	0	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.07	0.08
12898 <i>Festuca vasconensis</i>	273.5	273.5	273.6	273.6	273.7	273.7	273.7	273.7	273.8	273.8
13095 <i>Zostera noltii</i>	0	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.07	0.08
14163 <i>Alyssum loiseleurii</i>	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
16260 <i>Matricaria maritima</i>	0	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.07	0.08

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF FLORA SPECIES WITH AN APPROVED MANAGEMENT PLAN, IN AREAS OF TRANSITIONAL WATER BODIES.

SPECIES	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
11616 <i>Chamaesyce peplis</i>	0.58	0.64	1.03	1.15	1.71	2.02	1.79	2.06	2.26	2.29
11650 <i>Medicago marina</i>	0.04	0.04	0.07	0.07	0.09	0.12	0.1	0.12	0.17	0.18
12157 <i>Limonium humile</i>	1.45	1.46	1.46	1.47	1.47	1.48	1.47	1.48	1.49	1.49
12346 <i>Galium arenarium</i>	0.04	0.04	0.07	0.07	0.09	0.12	0.1	0.12	0.17	0.18
12898 <i>Festuca vasconensis</i>	0.04	0.04	0.07	0.07	0.09	0.12	0.1	0.12	0.17	0.18
13095 <i>Zostera noltii</i>	171.3	171.3	171.4	171.4	171.5	171.5	171.5	171.6	171.6	171.6
14163 <i>Alyssum loiseleurii</i>	0.04	0.04	0.07	0.07	0.09	0.12	0.1	0.12	0.17	0.18
16260 <i>Matricaria maritima</i>	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16625 <i>Solidago virgaurea</i> ssp, m	0.04	0.04	0.07	0.07	0.09	0.12	0.1	0.12	0.17	0.18
16651 <i>Apium graveolens</i> ssp, but	6.93	6.98	7.16	7.18	7.26	7.3	7.27	7.31	7.34	7.35

TABLES SHOWING HCIS AND EUNIS HABITATS

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF HCIS, IN AREAS OF NATURAL SPACES PROTECTED BY REGIONAL REGULATIONS.

HCI	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
1110	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
1130	2.26	2.28	2.45	2.49	2.63	2.74	2.66	2.77	2.92	2.95
1170	26.8	27.1	27.04	27.39	27.23	27.46	27.84	28.15	28.09	28.59
1230	5.63	5.78	5.72	5.89	5.82	5.91	6	6.08	6.04	6.19
1420	0.89	0.89	0.92	0.92	0.93	0.94	0.93	0.94	0.95	0.96
2110	0.04	0.05	0.08	0.1	0.21	0.25	0.23	0.26	0.29	0.31
2120	0	0	0.02	0.04	0.06	0.07	0.07	0.08	0.09	0.1
4090	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
6510	1.44	1.46	1.53	1.55	1.61	1.65	1.62	1.66	2.37	2.48
4040	0.82	0.9	0.89	0.97	0.96	1.01	1.03	1.08	1.08	1.16
6210	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF HCIS, IN AREAS OF THE NATURA NETWORK.

HCI	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
91EO	5.9	6.31	7.81	8.07	8.84	9.44	9	9.59	10.35	10.49
1110	4.85	4.85	4.87	4.87	4.87	4.88	4.87	4.88	4.88	4.88
1130	1115.4	1165	1193.2	1197.9	1216.7	1229.6	1220.2	1232.2	1245.3	1247.4
1170	109.03	109.41	109.55	109.81	109.88	109.93	110.11	110.27	110.37	110.56
1230	44.24	45.29	45.66	46.84	46.99	47.96	48.08	48.91	49.32	50.19
1310	25.59	25.81	26.76	26.94	27.54	27.97	27.69	28.02	28.19	28.22
1320	1.62	1.62	1.65	1.66	1.69	1.73	1.7	1.74	1.84	1.85
1410	306.01	307.31	308.75	308.96	309.61	309.99	309.73	310.06	310.27	310.3
1420	118.89	118.98	119.34	119.4	120.66	120.81	120.7	120.84	121.04	121.08
2110	3.16	3.31	4.08	4.28	5.43	6.05	5.59	6.2	7.48	7.71
2120	0.68	0.74	0.99	1.06	1.26	1.53	1.32	1.6	2.07	2.13
2130	4.86	5.5	8.81	9.66	14.15	18.39	15.38	19.36	24.13	25.08
4030	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07
4040	2.65	2.93	2.9	3.19	3.16	3.34	3.44	3.62	3.64	3.9
4090	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
6210	0.42	0.45	0.57	0.64	0.78	0.84	0.81	0.87	0.97	1
6410	0.12	0.13	0.13	0.14	0.13	0.14	0.14	0.15	0.14	0.15
6510	20.39	24.02	33.22	34.55	41.53	46.42	42.74	47.66	54.56	55.57
7230	1.97	1.99	2.12	2.15	2.18	2.2	2.19	2.2	2.21	2.21
9230	0.03	0.04	0.03	0.05	0.04	0.05	0.05	0.06	0.06	0.07
9340	3.1	3.18	3.46	3.55	3.86	4.18	3.98	4.26	4.55	4.62

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF HCIS, IN BIOSPHERE RESERVE AREAS.

HCI	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
1110	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
1130	464.31	488.86	499.05	500.77	508.51	513.73	510	514.82	520.14	521.07
1170	22.93	22.97	23.08	23.12	23.21	23.29	23.25	23.32	23.4	23.43
1230	15.35	15.78	15.97	16.46	16.56	17.01	17.03	17.4	17.62	17.95
1310	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
1320	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
1410	150.79	151.44	152.15	152.26	152.56	152.72	152.6	152.75	152.86	152.87
2110	0.25	0.28	0.41	0.45	0.78	0.85	0.81	0.86	0.93	0.95
2120	0.01	0.01	0.02	0.02	0.04	0.06	0.04	0.07	0.07	0.07
6510	3.14	4.83	7.18	7.67	11.33	13.42	11.85	14	18.94	19.5
9340	2.37	2.45	2.66	2.75	2.98	3.22	3.09	3.3	3.52	3.6
2130	2.33	2.65	4.25	4.66	6.82	8.86	7.42	9.3	11.56	12.01
4040	0.16	0.17	0.2	0.22	0.26	0.3	0.27	0.32	0.36	0.37
6210	0.06	0.06	0.07	0.08	0.09	0.1	0.1	0.11	0.12	0.13
91EO	1.59	1.76	2.33	2.41	2.58	2.68	2.61	2.71	2.86	2.88
1420	54.99	55	55.06	55.07	55.7	55.75	55.71	55.76	55.84	55.86

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF HCIS, IN RAMSAR AREAS.

HCI	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
91EO	1.42	1.59	2.15	2.23	2.4	2.5	2.43	2.53	2.66	2.68
1110	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
1130	417.83	432.48	439.99	441.37	447.37	451.9	448.69	452.83	457.47	458.29
1170	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
1310	14.92	15.06	15.63	15.73	16.09	16.34	16.17	16.37	16.48	16.49
1320	0.77	0.78	0.79	0.79	0.81	0.83	0.81	0.83	0.88	0.89
1410	123.16	123.75	124.23	124.3	124.51	124.61	124.54	124.63	124.69	124.7
1420	53.07	53.08	53.12	53.12	53.15	53.17	53.16	53.18	53.21	53.22
2110	0.2	0.21	0.29	0.32	0.6	0.62	0.61	0.62	0.63	0.63
2120	0.01	0.01	0.02	0.02	0.04	0.06	0.04	0.07	0.07	0.07
2130	2.31	2.63	4.23	4.64	6.8	8.84	7.4	9.28	11.54	11.99
6510	6.47	7.01	7.93	8.14	9.17	9.89	9.35	10.06	11.28	11.47
7230	1.78	1.79	1.89	1.91	1.93	1.94	1.93	1.94	1.95	1.95
9340	0.77	0.78	0.88	0.9	1.01	1.1	1.04	1.12	1.22	1.24

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF HCIS, IN AREAS OF COASTAL WATER BODIES.

HCI	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
1110	4.29	4.3	4.31	4.31	4.33	4.34	4.33	4.35	4.36	4.36
1130	1.46	1.46	1.47	1.48	1.49	1.5	1.5	1.5	1.52	1.52
1170	113.88	114.04	114.25	114.36	114.54	114.86	114.67	115.09	115.68	115.74
1230	6.92	6.93	6.93	6.95	6.95	6.96	6.96	6.97	6.97	6.98
1420	0.63	0.64	0.66	0.66	0.67	0.67	0.67	0.68	0.68	0.69
2110	0.04	0.05	0.08	0.1	0.21	0.25	0.23	0.25	0.27	0.27
2120	0	0	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04
6410	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
6510	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
9340	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
4040	0.1	0.1	0.11	0.11	0.11	0.12	0.11	0.12	0.13	0.13
6210	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF HCIS, IN AREAS OF TRANSITIONAL WATER BODIES.

HCI	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
1110	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63
1130	713.89	739.93	758.6	761.97	774.28	782.99	776.58	784.87	794.84	796.24
1170	8.47	8.5	8.61	8.64	8.81	8.92	8.85	8.95	9.06	9.09
1230	1.92	1.94	1.99	2.01	2.05	2.09	2.07	2.11	2.15	2.16
1310	1.29	1.29	1.3	1.3	1.31	1.31	1.31	1.31	1.31	1.31
1320	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
1410	156.92	157.56	158.22	158.32	158.59	158.74	158.63	158.77	158.89	158.9
1420	75.04	75.19	75.76	75.85	76.6	76.91	76.7	76.95	77.18	77.21
2110	1.34	1.38	1.52	1.56	1.9	1.97	1.93	1.99	2.07	2.08
2120	0.11	0.12	0.17	0.18	0.21	0.25	0.22	0.25	0.27	0.27
2130	2.33	2.65	4.25	4.66	6.82	8.86	7.42	9.3	11.56	12.01
4030	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
4040	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
6210	0.19	0.2	0.39	0.46	0.55	0.57	0.55	0.57	0.57	0.57
6510	4.94	6.27	7.86	8.11	8.89	9.56	9.02	9.73	10.81	10.88
91EO	6.02	6.29	7.28	7.45	8.05	8.56	8.19	8.68	9.4	9.53
9340	1.37	1.4	1.55	1.58	1.7	1.8	1.74	1.82	1.9	1.91

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF EUNIS HABITATS, IN AREAS OF NATURAL SPACES PROTECTED BY REGIONAL REGULATIONS.

EUNIS HABITATS	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
B3.23	26.12	26.76	26.71	27.33	27	27.64	28	28.48	28.35	29
A1.11	22.82	23.09	23.05	23.37	23.22	23.44	23.81	24.11	24.06	24.53
A1.2	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
A2.221	4.82	4.91	5.18	5.26	5.5	5.71	5.57	5.78	6	6.04
A2.658	0.89	0.89	0.92	0.92	0.93	0.94	0.93	0.94	0.95	0.96
A3.12	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
A3.13	2.44	2.47	2.46	2.48	2.47	2.48	2.49	2.5	2.49	2.52
A3.15	2.44	2.47	2.46	2.48	2.47	2.48	2.49	2.5	2.49	2.52
A3.2	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
A3.3	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
A5.23	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
B	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
B1.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
B1.21	6.08	6.16	6.41	6.5	6.75	7.02	6.84	7.11	7.44	7.53
B1.31	0.04	0.05	0.08	0.1	0.21	0.25	0.23	0.26	0.29	0.31
B1.32	0	0	0.02	0.04	0.06	0.07	0.07	0.08	0.09	0.1
B2	2.66	2.68	2.68	2.69	2.68	2.69	2.69	2.7	2.7	2.7
B3.31	0.7	0.75	0.73	0.8	0.77	0.82	0.86	0.89	0.88	0.95
C2.4	0.5	0.5	0.5	0.5	0.5	0.51	0.5	0.51	0.52	0.52
E1.26	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08
E2.11	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.14	0.15
E2.21	1.44	1.46	1.53	1.55	1.61	1.65	1.62	1.66	2.37	2.48
E2.6	0.04	0.05	0.07	0.08	0.1	0.11	0.1	0.11	0.12	0.12
E5,31(X)	0	0	0	0	0	0	0.01	0.01	0.01	0.01
F4,23(X)	0	0	0	0	0	0	0	0	0	0
F4.231	0.82	0.9	0.89	0.97	0.96	1.01	1.03	1.08	1.08	1.16
F7,44(Y)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
G1.86	0	0	0	0	0	0	0	0	0	0
G2.121	0	0	0	0	0	0	0	0	0	0
I1.2	1.33	1.36	1.46	1.47	1.54	1.59	1.55	1.61	2.44	2.5
I2.1	0	0	0	0	0	0	0	0	0	0
J1	0.01	0.01	0.02	0.03	0.03	0.03	0.03	0.03	0.04	0.04
J4.2	0	0	0	0	0	0.01	0	0.01	0.01	0.01
X01	2.26	2.28	2.45	2.49	2.63	2.75	2.66	2.77	2.92	2.95

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF EUNIS HABITATS, IN AREAS OF THE NATURA NETWORK.

EUNIS HABITATS	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
B3.23	62.85	64.71	64.68	66.62	66.37	67.69	68.22	69.36	69.56	71.14
A1.11	82.92	83.23	83.34	83.53	83.58	83.64	83.75	83.9	83.97	84.11
A1.2	3.52	3.52	3.53	3.53	3.54	3.55	3.54	3.55	3.55	3.55
A2.221	8.49	8.58	9.01	9.13	9.98	10.31	10.09	10.38	10.77	10.84
A2.511	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69
A2.61	26.24	26.24	26.24	26.24	26.24	26.24	26.24	26.24	26.24	26.24
A2.627	184.29	190.47	192.85	193.23	194.33	194.92	194.5	195.03	195.66	195.8
A2.636	242.36	243.44	244.15	244.25	244.58	244.83	244.65	244.87	245.01	245.03
A2.63C	113.5	127.91	131.06	131.63	133.22	134.18	133.48	134.38	135.06	135.14
A2.651	11.31	11.41	11.9	11.99	12.21	12.37	12.25	12.4	12.56	12.58
A2.654	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.47	1.47
A2.658	118.89	118.98	119.34	119.4	120.66	120.81	120.7	120.84	121.04	121.08
A3.12	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
A3.13	17.48	17.54	17.56	17.62	17.64	17.62	17.69	17.7	17.73	17.77
A3.15	17.48	17.54	17.56	17.63	17.64	17.63	17.69	17.7	17.73	17.77
A3.2	4.64	4.64	4.64	4.64	4.64	4.65	4.64	4.65	4.65	4.65
A3.3	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
A5.23	3.16	3.16	3.17	3.18	3.18	3.19	3.18	3.19	3.19	3.19
B	230.27	230.5	231.55	231.77	232.44	232.77	232.54	232.83	233.27	233.36
B1.1	0.88	0.88	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
B1.21	12.54	12.85	14.21	14.47	15.62	16.68	15.92	16.91	17.74	17.84
B1.31	3.16	3.31	4.08	4.28	5.43	6.05	5.59	6.2	7.48	7.71
B1.32	0.68	0.74	0.99	1.06	1.26	1.53	1.32	1.6	2.07	2.13
B1.42	4.86	5.5	8.81	9.66	14.15	18.39	15.38	19.36	24.13	25.08
B2	6.55	6.64	6.64	6.72	6.72	6.78	6.79	6.84	6.86	6.93
B3.31	8.53	8.77	9	9.29	9.45	9.76	9.72	10.02	10.25	10.5
C1	19.65	19.84	20.58	20.72	22.49	22.93	22.65	22.98	23.33	23.39
C2	1.09	1.11	1.18	1.19	1.25	1.3	1.26	1.32	1.38	1.38
C2.4	98.48	98.68	99.6	99.78	100.51	101.05	100.65	101.19	101.92	102.03
C3.21	3.02	3.1	3.45	3.5	3.99	4.15	4.03	4.2	4.67	4.73
C3.22	0.62	0.63	0.63	0.64	0.64	0.64	0.64	0.64	0.64	0.64
C3.23	1.97	1.99	2.12	2.15	2.18	2.2	2.19	2.2	2.21	2.21
E1.26	0.36	0.39	0.5	0.57	0.69	0.74	0.72	0.77	0.86	0.88
E2.11	12.94	13.39	15.47	15.65	16.01	16.21	16.06	16.25	16.39	16.42
E2.21	20.16	23.78	32.95	34.27	40.87	45.65	42.05	46.86	53.35	54.3
E2.6	3	3.21	4.04	4.08	4.14	4.18	4.15	4.2	4.6	4.8
E3.41	119.31	123.41	136.01	138.53	146.4	152.37	147.95	153.7	161.44	162.56
E3.51	0.12	0.13	0.13	0.14	0.13	0.14	0.14	0.15	0.14	0.15
E5,31(X)	0.21	0.25	0.35	0.36	0.42	0.45	0.43	0.45	0.47	0.48
F3,11(Y)	0.33	0.33	0.35	0.36	0.37	0.38	0.37	0.38	0.4	0.4
F3.13	0.07	0.08	0.1	0.1	0.12	0.13	0.12	0.13	0.14	0.14
F3,15(Y)	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.09
F4,23(X)	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07
F4.231	2.65	2.93	2.9	3.19	3.16	3.34	3.44	3.62	3.64	3.9
F7,44(Y)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
F9,2(X)	5.45	6.96	7.46	7.6	8.22	8.87	8.38	8.97	10.12	10.31
FA.3	2.37	2.47	2.86	2.92	3.21	3.37	3.25	3.41	3.7	3.73
G1,21(Z)	5.9	6.31	7.81	8.07	8.83	9.44	9	9.59	10.35	10.49
G1,7B1	0.03	0.04	0.03	0.05	0.04	0.05	0.05	0.06	0.06	0.07
G1.86	2.42	2.45	2.67	2.69	2.89	3.01	2.92	3.03	3.16	3.18
G1,A1	5.67	5.94	7.3	7.6	8.64	9.34	8.85	9.48	10.06	10.15
G1,A1(X)	0.13	0.13	0.14	0.14	0.14	0.15	0.14	0.15	0.15	0.15
G1,C(X)	0.91	1.06	2.08	2.21	2.55	2.77	2.61	2.82	3.15	3.25
G1,C(Y)	0.08	0.08	0.09	0.09	0.09	0.51	0.09	0.51	0.51	0.52
G1,C1	0.46	0.48	0.65	0.71	0.8	1.54	1.05	1.64	2.29	2.41
G1,C3	0.26	0.28	0.32	0.33	0.36	0.37	0.37	0.38	0.39	0.39
G1,D(X)	2.59	2.61	2.89	2.96	3.13	3.47	3.18	3.57	4.3	4.34
G2.121	3.09	3.16	3.45	3.53	3.85	4.16	3.96	4.24	4.54	4.61
G2.81	0.79	0.82	0.89	0.9	0.93	0.96	0.94	0.96	1	1.01

G3,F(M)	5.1	5.35	6.2	6.36	7.34	7.99	7.56	8.09	8.51	8.57
G3,F(P)	5	6.16	8.01	8.52	11.12	12.75	11.6	13.1	13.95	14.1
G4,(Z)	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05
G5.61	7.33	24.97	26.92	27.24	31.07	32.74	31.41	32.97	34.15	34.32
G5.72	3.57	3.72	4.77	4.99	5.66	5.89	5.74	5.94	6.08	6.09
G5.73	0	0	0	0	0	0	0	0	0	0
G5.74	0.16	0.16	0.17	0.18	0.37	0.67	0.42	0.96	1.21	1.25
G5.75	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.04
G5.81	0	0	0	0	0	0	0	0	0	0
G5.82	0.1	0.1	0.12	0.12	0.14	0.16	0.14	0.17	0.22	0.24
H5.6	2.64	2.66	2.72	2.74	2.8	2.83	2.81	2.84	2.86	2.87
I1.2	37.92	38.5	43.65	44.8	51.43	56.84	52.63	57.97	62.36	63.06
I2.1	0	0	0	0	0	0	0	0	0	0
I2.2	16.86	17.51	18.94	19.12	19.64	19.85	19.7	19.9	20.27	20.34
J	0.27	0.27	0.27	0.27	0.27	0.28	0.27	0.29	0.31	0.31
J1	11.27	11.94	14.99	15.6	17.52	19.37	18	20.29	24.08	24.94
J2	0.73	0.78	1.05	1.13	1.4	1.58	1.45	1.62	1.99	2.05
J2.53	0.35	0.35	0.35	0.35	0.36	0.36	0.36	0.36	0.36	0.36
J4.1	2.09	2.25	3.23	3.36	3.68	4.34	3.8	4.5	5.66	5.92
J4.2	0.18	0.19	0.23	0.23	0.28	0.4	0.31	0.43	0.54	0.56
J4.5	0.49	0.52	0.54	0.57	0.59	0.64	0.63	1.3	1.63	1.66
J4.6	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.04
X01	1056.05	1105.25	1133.2	1137.95	1156.65	1169.52	1160.15	1172.18	1185.29	1187.33

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF EUNIS HABITATS, IN BIOSPHERE RESERVE AREAS.

EUNIS HABITATS	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
A1.11	20.26	20.31	20.4	20.44	20.52	20.6	20.55	20.62	20.69	20.72
A1.2	1.53	1.53	1.55	1.55	1.56	1.56	1.56	1.57	1.57	1.57
A2.221	2.31	2.34	2.52	2.57	2.96	3.1	3.01	3.13	3.29	3.32
A2.511	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
A2.61	13.07	13.07	13.07	13.07	13.07	13.07	13.07	13.07	13.07	13.07
A2.627	86.74	89.82	91.07	91.26	91.79	92.05	91.87	92.1	92.25	92.27
A2.636	119.21	119.75	120.1	120.15	120.29	120.38	120.31	120.4	120.47	120.48
A2.63C	44.03	51.28	52.82	53.1	53.82	54.28	53.94	54.38	54.73	54.78
A2.651	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
A2.654	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
A2.658	54.99	55	55.05	55.06	55.69	55.75	55.71	55.76	55.84	55.86
A3.13	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
A3.15	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
A3.2	1.04	1.04	1.04	1.04	1.04	1.05	1.05	1.05	1.05	1.05
A5.23	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
B	114.99	115.11	115.64	115.75	116.09	116.25	116.13	116.28	116.5	116.54
B1.1	0.43	0.43	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
B1.21	3.74	3.9	4.59	4.71	5.28	5.8	5.44	5.91	6.31	6.37
B1.31	0.25	0.28	0.41	0.45	0.78	0.85	0.81	0.86	0.93	0.95
B1.32	0.01	0.01	0.02	0.02	0.04	0.06	0.04	0.07	0.07	0.07
B1.42	2.33	2.65	4.25	4.66	6.82	8.86	7.42	9.3	11.56	12.01
B3.23	18.4	18.89	19.06	19.6	19.67	20.14	20.19	20.57	20.77	21.14
B3.31	0.52	0.53	0.58	0.59	0.63	0.67	0.64	0.68	0.73	0.73
C2	1.68	1.71	1.84	1.86	1.96	2.08	1.99	2.11	2.28	2.31
C2.4	35.76	35.81	36.03	36.07	36.29	36.44	36.33	36.48	36.64	36.67
C3.21	1.8	1.87	2.19	2.23	2.35	2.43	2.37	2.45	2.53	2.54
E1.26	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03
E2.11	0.05	0.06	0.06	0.07	0.1	0.17	0.12	0.18	0.27	0.29
E2.21	3.08	4.77	7.12	7.6	11.24	13.31	11.76	13.88	18.76	19.31
E3.41	60.67	62.78	69.44	70.78	75.16	78.54	76.01	79.3	86.16	86.89
E5.31(X)	0.11	0.13	0.17	0.18	0.21	0.22	0.21	0.22	0.24	0.24
F3.11(Y)	0.3	0.32	0.32	0.35	0.35	0.37	0.37	0.39	0.57	0.59
F4.231	0.16	0.17	0.2	0.22	0.26	0.3	0.27	0.32	0.36	0.37
F9.2(X)	1.91	2.63	2.74	2.77	2.92	3.05	2.97	3.06	3.09	3.09
FA.3	1.24	1.3	1.46	1.5	1.73	1.84	1.76	1.86	2.09	2.11
G1.21(Z)	1.59	1.76	2.33	2.41	2.58	2.68	2.61	2.71	2.86	2.89
G1.86	1.03	1.05	1.07	1.08	1.09	1.13	1.09	1.14	1.16	1.16
G1.A1	2.02	2.14	2.87	3.01	3.48	3.79	3.58	3.86	4.1	4.14
G1.C(Y)	0	0	0	0	0	0.41	0	0.41	0.41	0.41
G1.C1	0	0	0	0	0	0.87	0.62	0.91	1.03	1.04
G1.D(X)	0.09	0.09	0.1	0.11	0.12	0.13	0.12	0.13	0.15	0.15
G2.121	2.36	2.44	2.65	2.73	2.96	3.19	3.07	3.28	3.49	3.57
G2.81	0.19	0.2	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.24
G3.F(M)	2.55	2.67	3.1	3.17	3.67	4	3.78	4.05	4.27	4.31
G3.F(P)	2.85	3.48	4.5	4.81	6.23	7.3	6.53	7.54	8.17	8.29
G5.61	3.62	12.62	13.59	13.76	15.97	17.4	16.29	17.58	18.72	18.88
G5.74	0.01	0.01	0.02	0.02	0.12	0.34	0.14	0.62	0.85	0.88
G5.82	0.07	0.07	0.08	0.08	0.09	0.11	0.1	0.11	0.16	0.17
H5.6	1.41	1.42	1.46	1.48	1.52	1.55	1.53	1.56	1.61	1.68
I1.2	2.13	2.28	3.13	3.43	5.96	8.24	6.39	8.72	10.78	11.08
I2.2	8.46	8.78	9.5	9.59	9.86	9.98	9.89	10.02	10.93	11.07
J	0.08	0.08	0.08	0.09	0.12	0.14	0.12	0.15	0.23	0.23
J1	3.69	4.23	6.33	6.79	9.34	11.31	9.88	12.52	21.17	22.3
J2	0.57	0.59	0.71	0.74	0.9	1.03	0.93	1.16	1.72	1.79
J2.53	0.3	0.31	0.33	0.33	0.35	0.36	0.35	0.37	0.39	0.39
J4.1	0.97	1.05	1.54	1.65	1.84	2.12	1.9	2.2	2.89	3.04
J4.2	0.13	0.14	0.16	0.17	0.21	0.31	0.23	0.34	0.42	0.44
J4.5	0.59	0.62	0.66	0.68	0.91	1.05	0.95	2.95	4.17	4.35
X01	470.57	494.9	505.14	506.87	514.62	519.85	516.12	520.93	526.25	527.18

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF EUNIS HABITATS, IN RAMSAR AREAS.

EUNIS HABITATS	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
A2.221	0.18	0.2	0.28	0.32	0.6	0.64	0.62	0.65	0.68	0.68
A2.511	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
A2.61	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
A2.627	85.49	87.2	88.23	88.38	88.81	89.02	88.88	89.05	89.16	89.17
A2.636	91.84	92.34	92.47	92.49	92.55	92.59	92.56	92.6	92.63	92.63
A2,63C	51.41	55.96	56.55	56.66	57.05	57.3	57.12	57.35	57.58	57.61
A2.651	7.76	7.83	8.18	8.24	8.4	8.52	8.43	8.54	8.64	8.65
A2.654	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
A2.658	52.89	52.91	52.94	52.95	52.98	53	52.98	53	53.03	53.04
B	2.31	2.31	2.31	2.31	2.31	2.32	2.32	2.32	2.32	2.32
B1.21	0.9	1	1.43	1.5	1.84	2.15	1.93	2.21	2.36	2.36
B1.31	0.19	0.21	0.28	0.31	0.6	0.62	0.61	0.62	0.62	0.63
B1.32	0.01	0.01	0.02	0.02	0.03	0.06	0.04	0.06	0.07	0.07
B1.42	2.31	2.63	4.23	4.64	6.8	8.84	7.4	9.28	11.54	11.99
C1	10.74	10.86	11.31	11.39	12.3	12.54	12.38	12.56	12.76	12.79
C2	0.88	0.9	0.98	1	1.06	1.11	1.07	1.13	1.21	1.21
C2.4	34.81	34.88	35.13	35.18	35.41	35.57	35.46	35.61	35.77	35.8
C3.21	0	0	0	0	0.18	0.22	0.19	0.24	0.43	0.45
C3.22	0.62	0.63	0.63	0.64	0.64	0.64	0.64	0.64	0.64	0.64
C3.23	1.77	1.79	1.89	1.91	1.93	1.94	1.93	1.94	1.95	1.95
E2.21	6.46	6.99	7.91	8.12	8.98	9.65	9.14	9.8	10.84	11
E2.6	1.48	1.58	1.98	2	2.02	2.04	2.03	2.04	2.4	2.6
E3.41	51.7	53.69	59.07	60.25	63.38	65.82	64.05	66.4	69.69	70.09
E5,31(X)	0.11	0.13	0.17	0.18	0.21	0.22	0.21	0.22	0.24	0.24
F9,2(X)	2.63	3.38	3.59	3.65	3.89	4.15	3.95	4.19	4.75	4.85
FA.3	1	1.05	1.14	1.16	1.23	1.27	1.24	1.28	1.35	1.35
G1,21(Z)	1.42	1.59	2.15	2.23	2.4	2.5	2.43	2.53	2.66	2.68
G1.86	1.08	1.1	1.13	1.13	1.23	1.25	1.24	1.25	1.28	1.28
G1, A1	1.78	1.86	2.15	2.23	2.47	2.59	2.51	2.61	2.68	2.69
G2.121	0.74	0.76	0.85	0.88	0.98	1.08	1.01	1.1	1.19	1.21
G2.81	0.19	0.2	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
G3,F(M)	2.55	2.67	3.08	3.13	3.36	3.54	3.42	3.58	3.77	3.8
G3,F(P)	1.13	1.18	1.49	1.68	2.71	3.23	2.86	3.33	3.7	3.73
G5.61	1.19	5.83	6.26	6.34	7.11	7.37	7.18	7.43	7.72	7.77
G5.82	0.06	0.06	0.07	0.07	0.07	0.08	0.07	0.08	0.12	0.13
H5.6	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.35	0.41
I1.2	23.95	24.17	25.31	25.69	27.97	29.68	28.34	30.08	31.72	31.98
I2.2	8.4	8.73	9.45	9.54	9.82	9.95	9.86	9.99	10.27	10.36
J1	3.58	4.04	5.85	6.15	6.88	7.56	7.09	7.76	9.46	9.97
J2	0.12	0.13	0.18	0.2	0.26	0.29	0.27	0.3	0.39	0.41
J4.1	0.8	0.87	1.33	1.44	1.58	1.81	1.62	1.87	2.37	2.5
X01	355.7	369.89	376.9	378.19	383.83	387.99	385.06	388.85	393.25	394.02

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF EUNIS HABITATS, IN AREAS OF COASTAL WATER BODIES.

EUNIS HABITATS	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
B3.23	16.43	16.45	16.47	16.49	16.51	16.54	16.52	16.55	16.63	16.65
A1.11	77.48	77.59	77.68	77.71	77.74	77.84	77.79	77.93	78.05	78.06
A1.2	4.25	4.25	4.26	4.27	4.27	4.28	4.28	4.29	4.3	4.3
A2.221	7.41	7.41	7.41	7.41	7.42	7.42	7.42	7.42	7.42	7.42
A2.658	0.63	0.64	0.66	0.66	0.67	0.67	0.67	0.68	0.68	0.69
A3.12	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
A3.13	23.53	23.57	23.62	23.67	23.73	23.86	23.79	23.96	24.09	24.1
A3.15	23.53	23.57	23.62	23.68	23.74	23.86	23.79	23.97	24.1	24.11
A3.2	5.86	5.87	5.93	5.94	6.02	6.11	6.05	6.15	6.48	6.51
A3.3	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
A4.1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
A5.13	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
A5.23	4.27	4.28	4.3	4.3	4.31	4.33	4.31	4.33	4.34	4.34
A5.24	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
B	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
B1.1	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
B1.21	3.79	3.8	3.86	3.88	3.95	3.99	3.96	3.99	4.01	4.01
B1.31	0.04	0.05	0.08	0.1	0.21	0.25	0.23	0.25	0.27	0.27
B1.32	0	0	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04
B2	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64
B3.31	2.84	2.84	2.85	2.85	2.85	2.86	2.86	2.86	2.87	2.87
C2.4	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.96	0.96	0.96
E1.26	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.03
E2.21	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
E2.6	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05
E3.51	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
F4.231	0.1	0.1	0.11	0.11	0.11	0.12	0.11	0.12	0.13	0.13
G2.121	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
G2.81	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
G3,F(M)	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.09	0.09
G3,F(P)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
G5.74	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
I1.2	0.21	0.22	0.26	0.27	0.29	0.31	0.3	0.32	0.34	0.35
J	0.71	0.72	0.79	0.8	0.85	0.87	0.85	0.87	0.96	0.96
J1	0.18	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19
J2	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.12	0.12
J2.53	0.82	0.83	0.86	0.88	0.91	0.93	0.91	0.94	0.97	0.97
J4.2	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
J4.5	0.39	0.39	0.41	0.42	0.43	0.45	0.44	0.45	0.45	0.45
J4.6	0.02	0.02	0.03	0.04	0.04	0.05	0.04	0.05	0.07	0.08
X01	1.46	1.46	1.48	1.48	1.49	1.5	1.5	1.51	1.52	1.52

HECTARES POTENTIALLY AFFECTED IN TERMS OF RANGE AND DISTRIBUTION OF EUNIS HABITATS, IN AREAS OF TRANSITIONAL WATER BODIES.

EUNIS HABITATS	CLIMATE SCENARIOS									
	1	2	3	4	5	6	7	8	9	10
B3.23	3.8	3.84	3.93	3.97	4.05	4.13	4.09	4.17	4.25	4.28
A1.11	6.77	6.8	6.91	6.95	7.1	7.22	7.15	7.25	7.36	7.38
A1.2	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
A2.221	13.03	13.11	13.45	13.54	14.04	14.23	14.1	14.27	14.48	14.53
A2.511	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
A2.61	13.15	13.15	13.15	13.15	13.15	13.15	13.15	13.15	13.15	13.15
A2.627	87.2	90.27	91.24	91.4	91.87	92.15	91.95	92.21	92.65	92.75
A2.636	124.85	125.38	125.67	125.72	125.83	125.91	125.85	125.93	126.02	126.03
A2.63C	45.8	52.98	54.26	54.45	54.91	55.14	54.98	55.19	55.35	55.36
A2.651	1.29	1.29	1.3	1.3	1.31	1.31	1.31	1.31	1.31	1.31
A2.654	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
A2.658	75.04	75.19	75.75	75.84	76.6	76.9	76.69	76.95	77.17	77.2
A3.13	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
A3.15	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
A3.2	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
A3.3	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
A5.23	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.68	2.68
A5.24	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
A5.25	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
A5.33	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
A5.34	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
B	116.52	116.64	117.17	117.29	117.63	117.8	117.68	117.83	118.05	118.1
B1.1	0.47	0.47	0.47	0.47	0.48	0.48	0.48	0.48	0.48	0.48
B1.21	10.64	10.97	11.65	11.86	12.37	12.78	12.5	12.87	13.12	13.14
B1.31	1.34	1.38	1.52	1.56	1.9	1.97	1.93	1.99	2.07	2.08
B1.32	0.11	0.12	0.17	0.18	0.21	0.25	0.22	0.25	0.27	0.27
B1.42	2.33	2.65	4.25	4.66	6.82	8.86	7.42	9.3	11.56	12.01
B3.31	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
C1	1.09	1.09	1.11	1.11	1.13	1.16	1.14	1.17	1.21	1.22
C2	5.59	5.64	5.8	5.83	5.96	6.06	5.99	6.09	6.2	6.22
C2.4	61.32	61.55	62.35	62.51	63.19	63.66	63.35	63.79	64.55	64.64
C3.21	0.85	0.86	0.89	0.89	0.92	0.93	0.92	0.93	0.95	0.95
E1.26	0.17	0.19	0.38	0.44	0.53	0.54	0.53	0.54	0.54	0.54
E2.11	10.39	10.71	11.95	12.05	12.17	12.19	12.18	12.19	12.2	12.2
E2.21	4.85	6.18	7.77	8.02	8.79	9.46	8.92	9.63	10.71	10.77
E2.6	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.23	0.23
E3.41	45.27	46	47.39	47.57	48.16	48.72	48.32	48.86	49.72	49.81
E5.31(X)	0.11	0.13	0.17	0.18	0.2	0.2	0.2	0.21	0.21	0.21
E5.43(X)	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08
F3.11(Y)	0.15	0.15	0.16	0.16	0.16	0.17	0.16	0.17	0.17	0.17
F3.13	0.38	0.38	0.39	0.44	0.47	0.48	0.48	0.48	0.48	0.48
F3.15(Y)	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06
F4.23(X)	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
F4.231	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
F9.12(Y)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
F9.2(X)	1.89	2.62	2.71	2.73	2.81	2.87	2.83	2.87	2.88	2.88
F9.2(Y)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03
FA.3	0.4	0.41	0.42	0.43	0.44	0.45	0.44	0.45	0.46	0.46
G1.21(Z)	4.65	4.89	5.74	5.88	6.32	6.67	6.42	6.75	7.18	7.26
G1.86	2.42	2.46	2.61	2.65	2.75	2.86	2.78	2.88	3.01	3.03
G1.A1	2.21	2.29	2.52	2.56	2.68	2.75	2.7	2.76	2.8	2.81
G1.A1(X)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
G1.C(X)	2.42	2.53	3.02	3.09	3.35	3.58	3.41	3.64	4.02	4.08
G1.C(Y)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
G1.C1	0.36	0.37	0.5	0.55	0.6	0.95	0.61	1.01	1.33	1.38
G1.C2	0	0	0	0	0	0	0	0	0.02	0.02
G1.D(X)	1.78	1.8	2.01	2.07	2.22	2.55	2.27	2.64	3.33	3.38
G2.121	1.32	1.35	1.46	1.48	1.58	1.68	1.62	1.69	1.76	1.77

G2.81	1.06	1.07	1.11	1.12	1.15	1.18	1.16	1.19	1.23	1.23
G3,F(M)	1.55	1.64	1.89	1.92	1.99	2.03	2	2.04	2.08	2.08
G3,F(P)	1.12	1.6	1.98	2	2.21	2.24	2.22	2.25	2.27	2.28
G4,(Z)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
G5.61	4.91	13.8	14.61	14.73	15.81	16.04	15.88	16.08	16.25	16.27
G5.72	2.22	2.31	3	3.16	3.67	3.81	3.72	3.83	3.88	3.89
G5.73	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
G5.74	0.02	0.02	0.03	0.03	0.06	0.06	0.06	0.07	0.07	0.07
G5.75	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02
G5.82	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08
H5.6	0.89	0.9	0.91	0.92	0.93	0.93	0.93	0.93	0.96	1.02
I1.2	2.04	2.2	3.8	4.22	5.24	5.65	5.39	5.71	5.97	6.01
I2.1	0.04	0.03	0.03	0.03	0.04	0.05	0.04	0.05	0.06	0.06
I2.2	8.99	9.33	10.14	10.28	10.72	11.03	10.83	11.08	11.48	11.59
J	10.38	10.45	10.72	10.82	11.24	11.52	11.32	11.58	12.26	12.38
J1	5.69	5.99	7.03	7.32	8.26	8.95	8.46	9.14	9.98	10.12
J2	3.36	3.44	4.64	4.8	5.4	5.84	5.55	5.92	6.55	6.64
J2.53	0.47	0.47	0.48	0.48	0.49	0.51	0.49	0.51	0.52	0.52
J4	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.03
J4.1	0.72	0.73	0.86	0.87	0.93	1.11	0.96	1.15	1.34	1.41
J4.2	0.45	0.46	0.49	0.51	0.62	0.72	0.64	0.73	0.89	0.92
J4.3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
J4.5	3.12	3.18	3.45	3.52	4.15	4.62	4.29	4.72	5.56	5.67
J4.6	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04
J5.3	0	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
X01	721.06	746.87	765.6	768.98	781.31	790.01	783.61	791.89	801.87	803.27

