

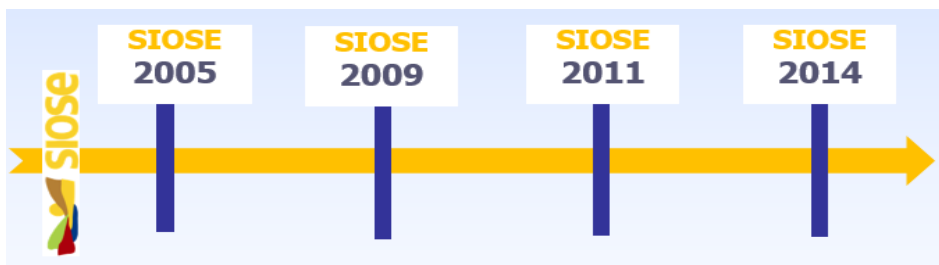
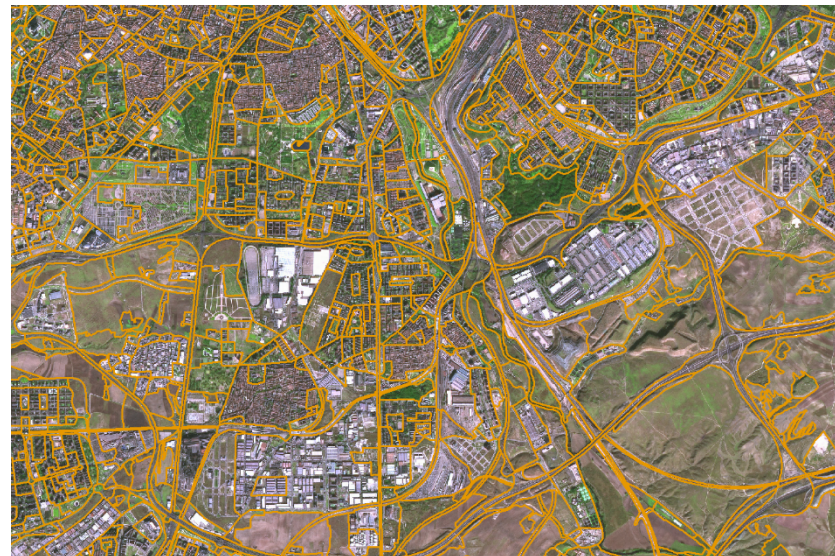


# Evaluation of the land use evolution near solid waste landfills using a new weighted environmental index based on GIS techniques

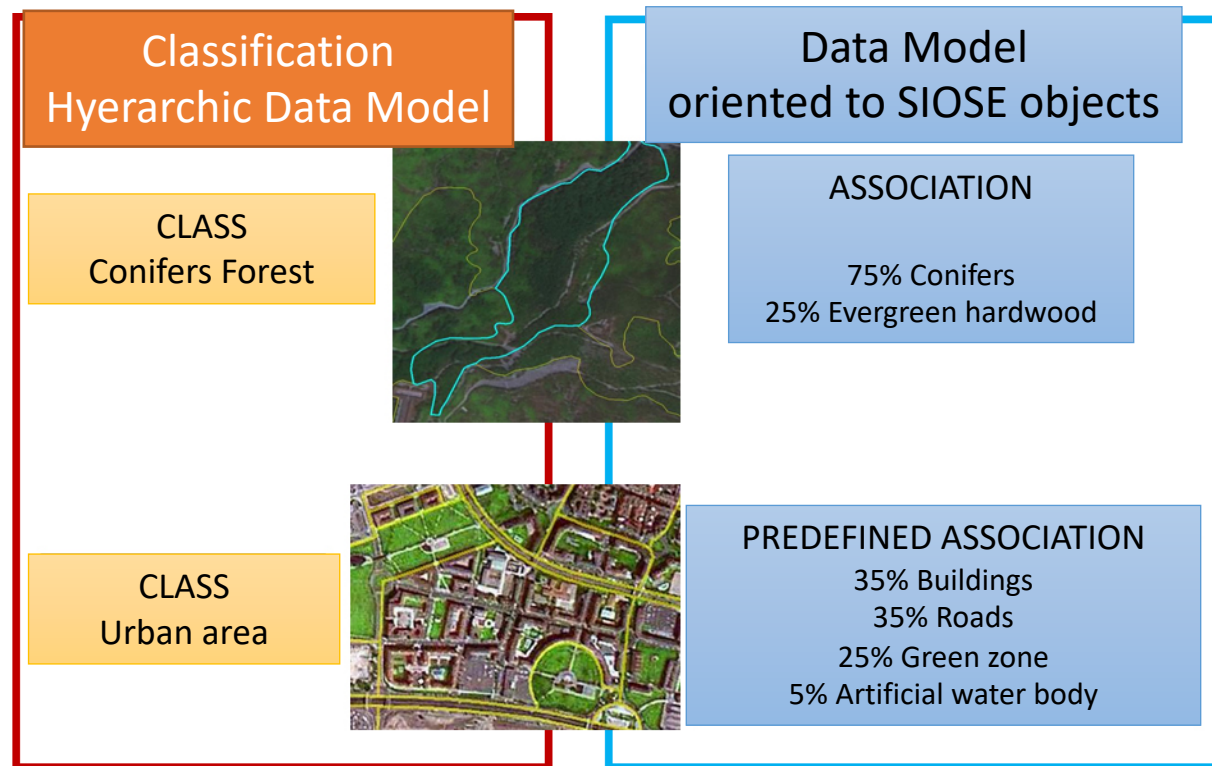
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- **SIOSE** is the Information System on LANDUSE in Spain;
- Its objective is to generate a database of landuse for all Spain at a 1: 25,000 scale.
- It is produced in a decentralized and coordinated manner between the different administrations following the INSPIRE principles, updated periodically.



Currently under development, High resolution SIOSE (scales 1:1000 and 1:5000)



- SIOSE is an object-oriented data model
- Therefore it is multipurpose and extensible
- Its main advantage is that you can customize queries and graphic outputs (maps)
- SIOSE is a database that does not classify the land but describes it by means of coverage or combinations of them with their different occupancy rates and attributes.

## Anthropization Index

SIOSE Index – Ministerio de Fomento, Spain.

Anthropization Index – Three values (-1, 0, 1)



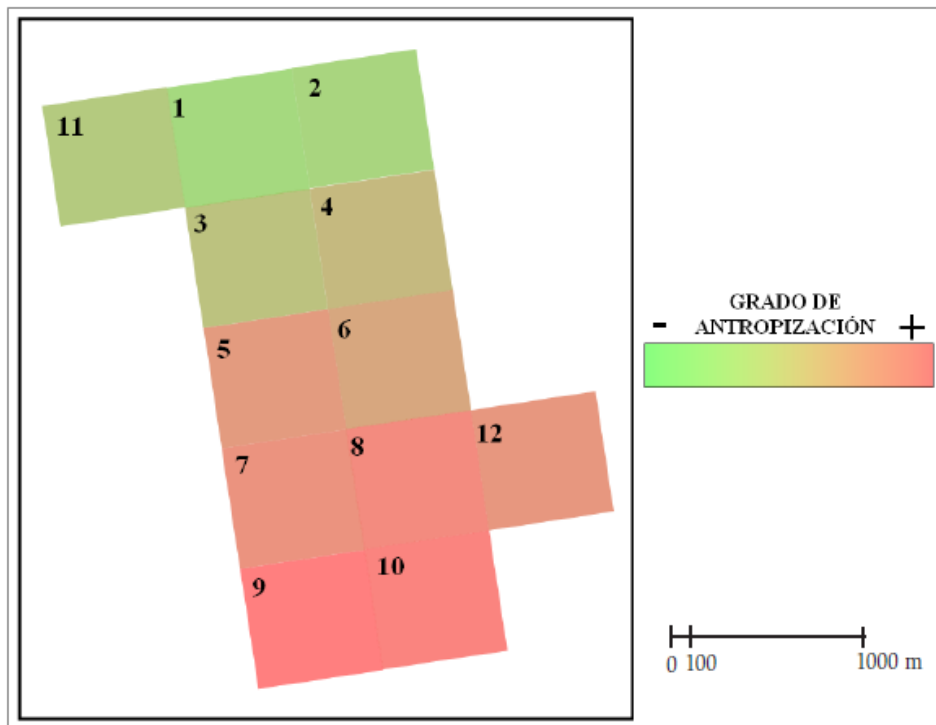
### Land Uses

- 1\_1\_Agriculture
- 1\_2\_Forestry
- 1\_3\_MiningAndQuarrying
- 1\_4\_AquacultureAndFishing
- 2\_SecondaryProduction
- 3\_1\_CommercialServices
- 3\_3\_CommunityServices
- 3\_4\_CulturalEntertainmentAndRecreationalServices
- 4\_1\_TransportNetworks
- 4\_3\_Uilities
- 5\_ResidentialUse
- 6\_1\_TransitionalAreas
- 6\_2\_AbandonedAreas
- 6\_3\_1\_LandAreasNotInOtherEconomicUse
- 6\_3\_2\_WaterAreasNotInOtherEconomicUse
- 6\_6\_NotKnownUse

## Updating the Anthropization Index

Relative Integrated Anthropization Index (INRA) – Martínez Dueñas (2010)

Land value according to degree of anthropization – Values between (0,1)



$$INRA = (\sum SUA' / n) \cdot 100$$

Theoretically based on the landuse Indicators Review - Antón Vallejo (2004)

- Land-use assessment based on occupied land and quantitative classifications
- Land-use assessment based on land production capacity
- Influence that land use will exert on its quality based on biodiversity indicators, life support functions and productivity

$0 < WEI < 39$	Low environmental value
$40 < WEI < 69$	Medium Environmental value
$70 < WEI < 100$	High environmental value

81 different WEI categories

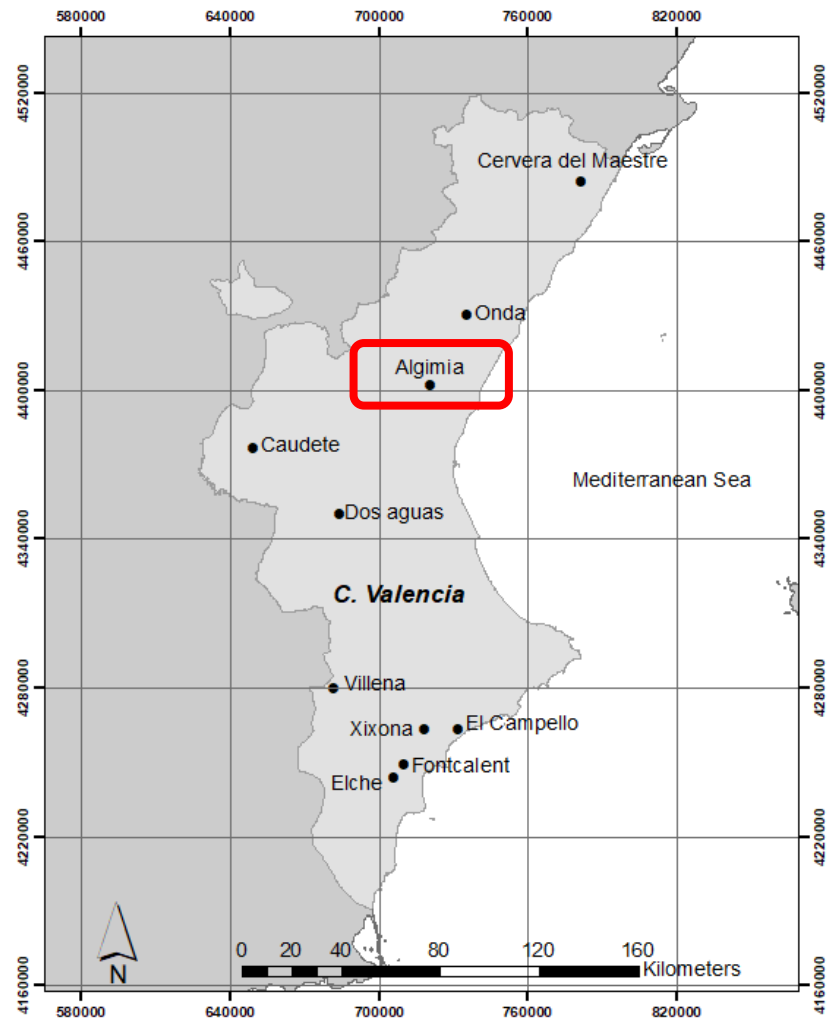
# Factors evaluation and final WEI values

LAND USE DESCRIPTION	F1 - Anthropic or natural nature	F2: Water consumption	F3: Soil degradation	F4: Environmental Sustainability	F5: Landscape value	WEI <sub>k</sub>
Buildings	20	40	20	15	5	20
Artificial Green Zone and Urban Trees	60	65	70	80	75	70
Artificial Water Body	65	85	85	65	50	70
Road, Parking or Pedestrian Area without vegetation	20	40	20	15	5	20
Other constructions	20	40	20	15	5	20
Soil without edifications	35	50	50	50	15	40
Extraction zones	0	50	0	0	0	10
Rice crops	60	10	80	45	55	50
Other crops different from rice	60	65	80	75	70	70
Citrics	60	65	80	75	70	70
Non citrics	60	65	80	75	70	70
Grapes	60	65	80	75	70	70
Olives	60	65	80	75	70	70
Other woody crops	60	65	80	75	70	70
Meadows	80	80	90	100	100	90
Pastureland	80	80	80	80	80	80
Hardwood deciduous	100	100	100	100	100	100
Evergreen hardwoods	100	100	100	100	100	100
Conifers	100	100	100	100	100	100
Scrub	70	70	70	70	70	70
Sandy beaches	100	100	50	100	100	90
Bare soil	70	50	20	20	40	40
Burned areas	0	50	0	0	0	10
Ravines	20	50	20	50	60	40
Marine cliffs	100	50	50	100	100	80
Rocky soil	80	50	30	30	60	50
Stone quarry	80	50	40	40	40	50

# Valencian Community Landfilling facilities

Management area	Landfill	Parent Company	UTM coordinates		Capacity (m <sup>3</sup> )
			X	Y	
C1	Cervera del Maestre	U.T.E. PLAN ZONAL R.S.U. ZONA 1 <sup>a</sup> (Bionord)	781.814	4.484.279	872.865
C2	Onda	RECIPLASA (public company and municipalities)	735.340	4.430.582	684.524
C3-V1	Algimia de Alfara	Reciclado Palancia Belcaire - RPB (TETma)	720.771	4.401.972	808.622
V2	Dos Aguas	U.T.E. DOS AGUAS (SAV, FCC)	684.001	4.350.298	5.618.259
V3	Caudete de las Fuentes	U.T.E ECORED (URBASER)	649.268	4.376.935	1.997.450
A1	El Campello	FCC	732.081	4.263.098	2.412.261
A2	Xixona	RECICLADOS Y COMPOSTAJE PIEDRA NEGRA,S.A.	718.590	4.263.442	2.577.105
A3	Villena	VAERSA (public company)	682.001	4.279.811	1.127.534
A4	Fontcalent	U.T.E. ALICANTE	709.909	4.249.478	5.244.391
A5	Elche	U.T.E. URBAHORMAR (URBASER, HORMIGONES MARTÍNEZ)	705.687	4.244.084	2.500.000

# Valencian Community Landfilling facilities



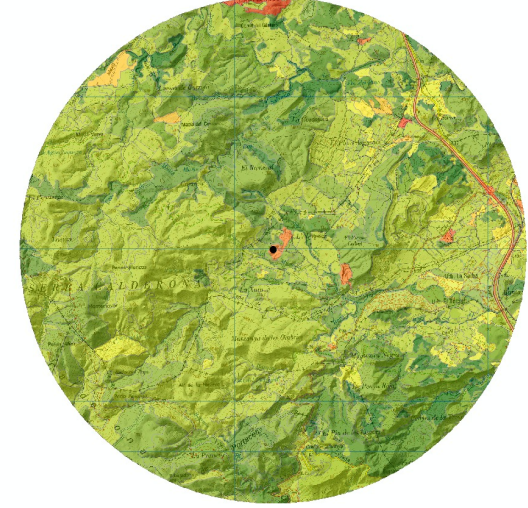
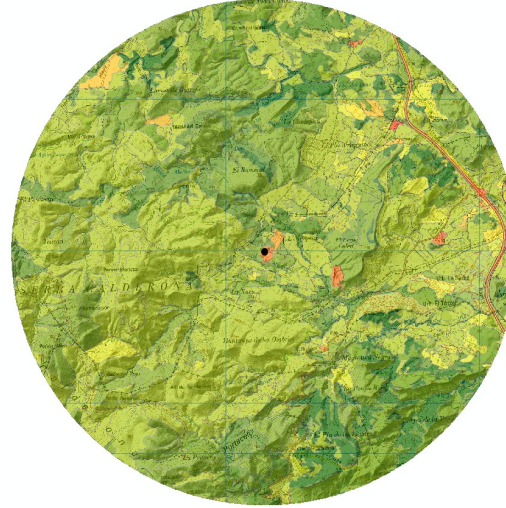
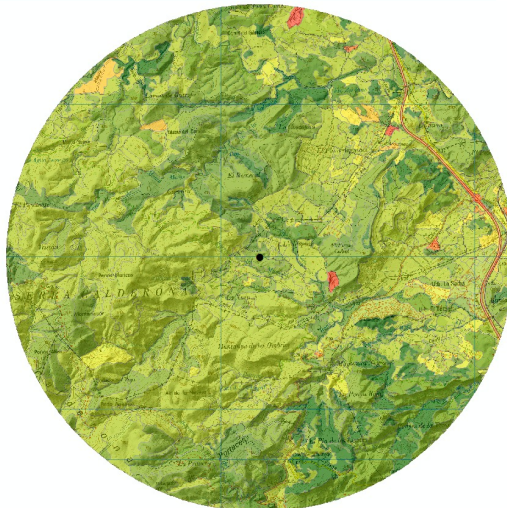
2005

2009

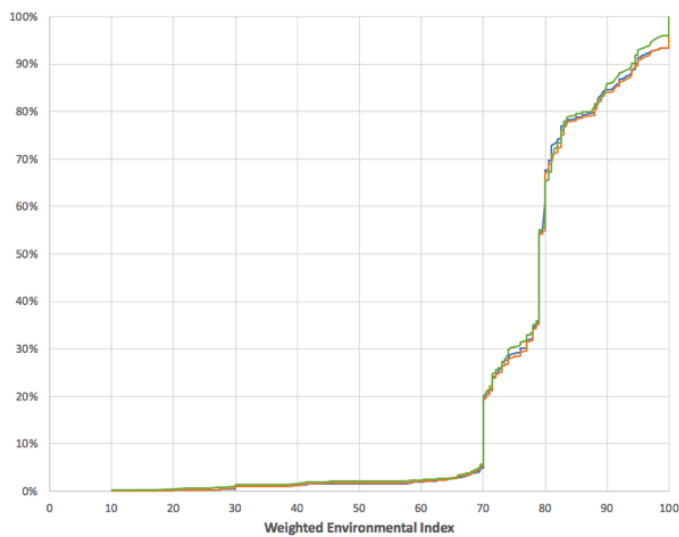
2014

WEI

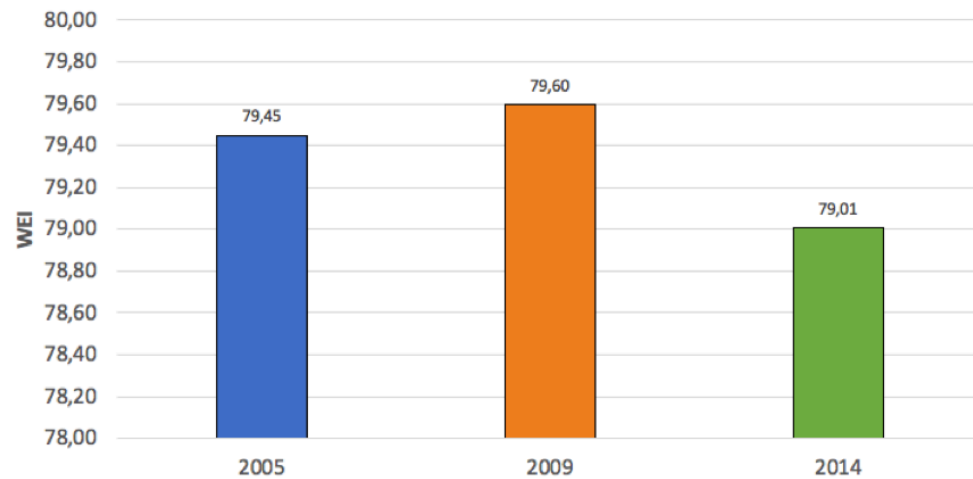
- 0 - 19.9
- 20 - 29.9
- 30 - 39.9
- 40 - 49.9
- 50 - 59.9
- 60 - 69.9
- 70 - 79.9
- 80 - 89.9
- 90 - 99.9
- 100



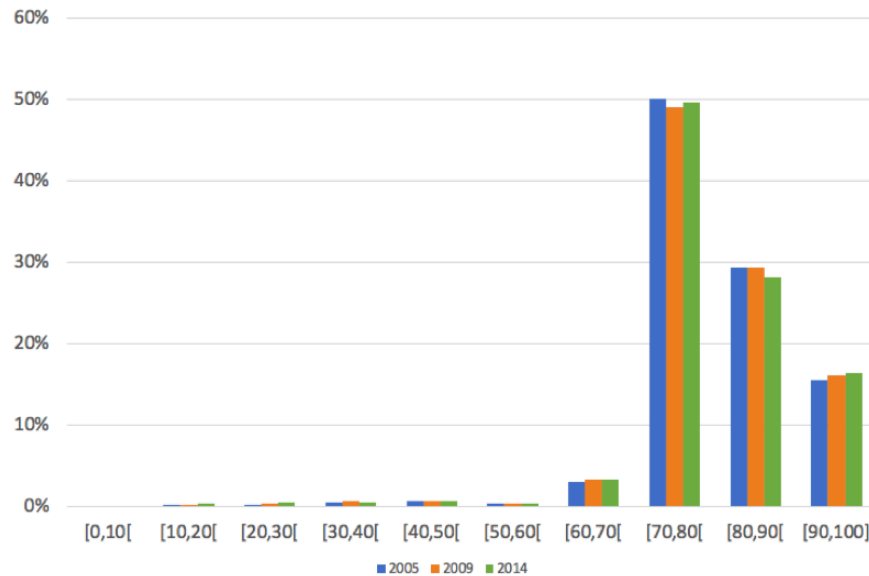
WEI DISTRIBUTION FUNCTION  
ALGIMIA D'ALFARA 2005-2009-2014



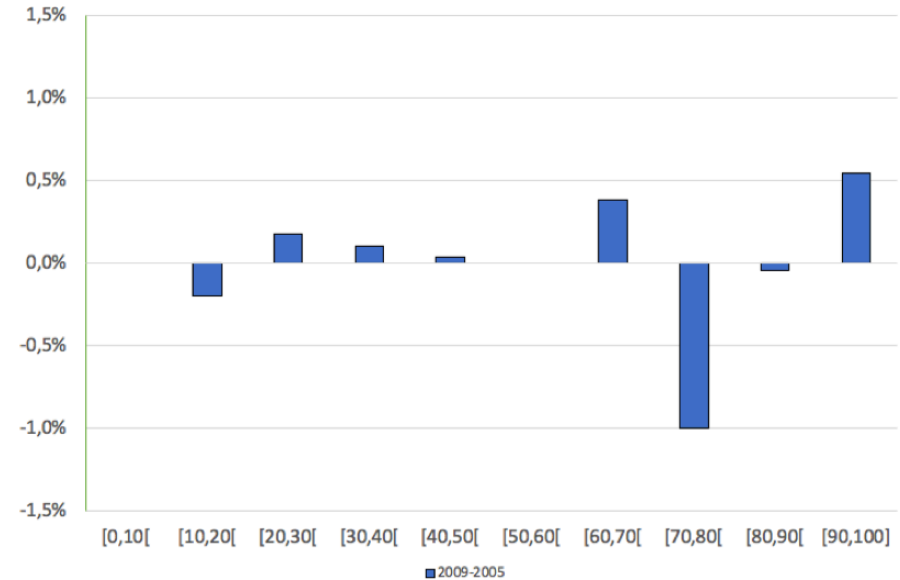
WEIGHTED ENVIRONMENTAL INDEX  
Alfara d'Algimia



**WEI DECILE EVOLUTION**  
Alгимia d'Alfara

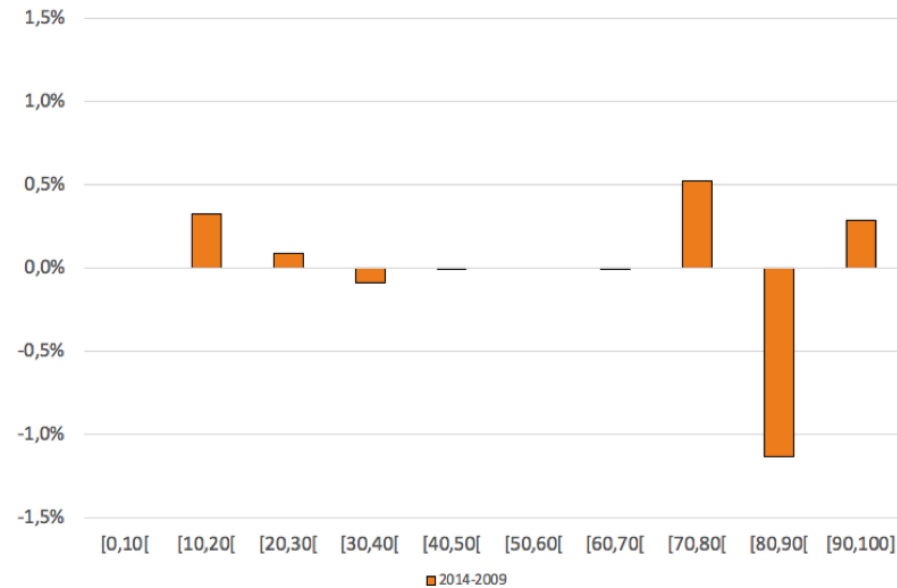


**WEI DECILE EVOLUTION 2005-2009**  
Alгимia d'Alfara

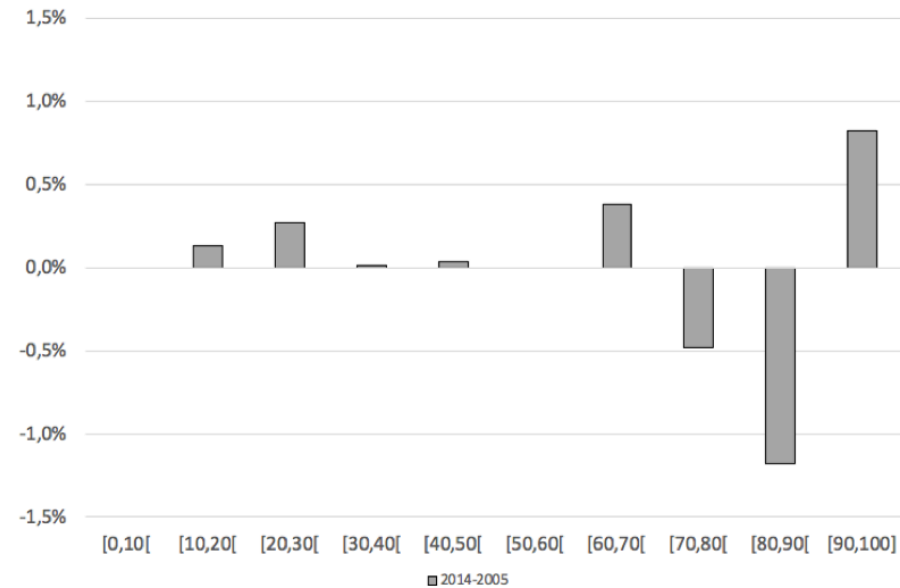


WEI	% Class Area			Diferences		
	2005	2009	2014	2009-2005	2014-2009	2014-2005
[0,10[	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
[10,20[	0,25%	0,05%	0,38%	-0,20%	0,33%	0,13%
[20,30[	0,23%	0,41%	0,50%	0,18%	0,09%	0,27%
[30,40[	0,52%	0,62%	0,53%	0,10%	-0,09%	0,01%
[40,50[	0,64%	0,67%	0,67%	0,04%	0,00%	0,04%
[50,60[	0,29%	0,29%	0,29%	0,00%	0,00%	0,00%
[60,70[	2,97%	3,36%	3,36%	0,38%	0,00%	0,38%
[70,80[	50,14%	49,14%	49,66%	-1,00%	0,52%	-0,48%
[80,90[	29,41%	29,36%	28,23%	-0,05%	-1,14%	-1,18%
[90,100]	15,54%	16,09%	16,37%	0,54%	0,28%	0,83%

WEI DECILE EVOLUTION 2009-2014  
Algimia d'Alfara



WEI DECILE EVOLUTION 2005-2014  
Algimia d'Alfara



WEI	% Class Area			Diferences		
	2005	2009	2014	2009-2005	2014-2009	2014-2005
[0,10[	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
[10,20[	0,25%	0,05%	0,38%	-0,20%	0,33%	0,13%
[20,30[	0,23%	0,41%	0,50%	0,18%	0,09%	0,27%
[30,40[	0,52%	0,62%	0,53%	0,10%	-0,09%	0,01%
[40,50[	0,64%	0,67%	0,67%	0,04%	0,00%	0,04%
[50,60[	0,29%	0,29%	0,29%	0,00%	0,00%	0,00%
[60,70[	2,97%	3,36%	3,36%	0,38%	0,00%	0,38%
[70,80[	50,14%	49,14%	49,66%	-1,00%	0,52%	-0,48%
[80,90[	29,41%	29,36%	28,23%	-0,05%	-1,14%	-1,18%
[90,100]	15,54%	16,09%	16,37%	0,54%	0,28%	0,83%

- WEI is a powerful tool to analyse landuse
- It covers a whole range of situations
- A complete analysis that includes all the landfills in Valencia Region will be made
- Final conclusions about landfilling environmental impacts over landuse will be made



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