

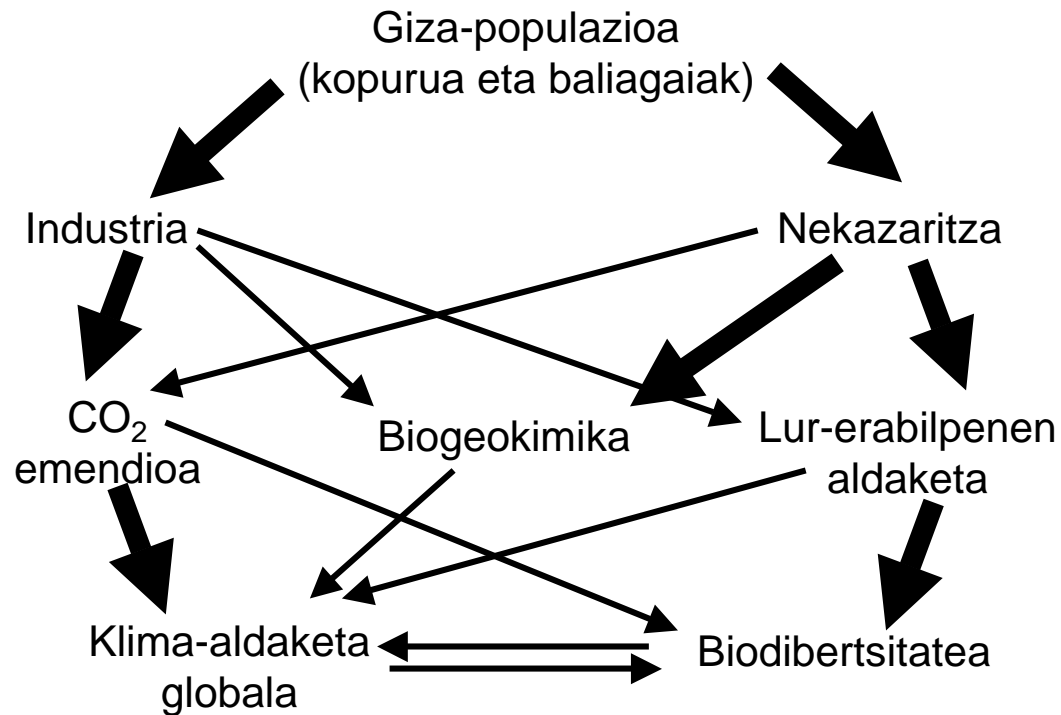


# INGURUMENAREN ALDAKETA GLOBALA: biziraupena auzitan

**Arturo Elosegi**

Zientzia eta Teknologia Fakultatea, EHU  
Natur Zientziak Saila, UEU

# Zer da ingurumenaren aldaketa globala?



Vitousek, 1994. *Ecology*

**Globala:** mundu osoan eragiten du  
atal guztiei eragiten die

Gauza berria ote da?

Nola ez gara lehenago ohartu?



Eibar, 2008-VI-30. UEUren udako saioaren sarrera-ekitaldia

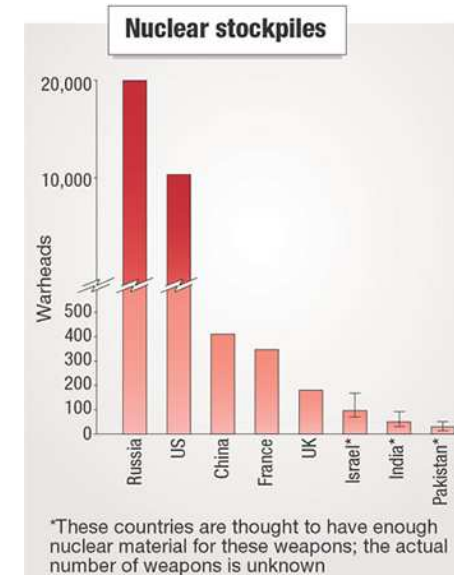
## **Biziraupena auzitan ote dago?**

- ✓ Gaurko bizimoduak ezin du iraun
- ✓ Askoren biziraupena arriskuan
- ✓ Gure biziraupena ere arriskuan:
  - Ekosistemen zerbitzuak galdu

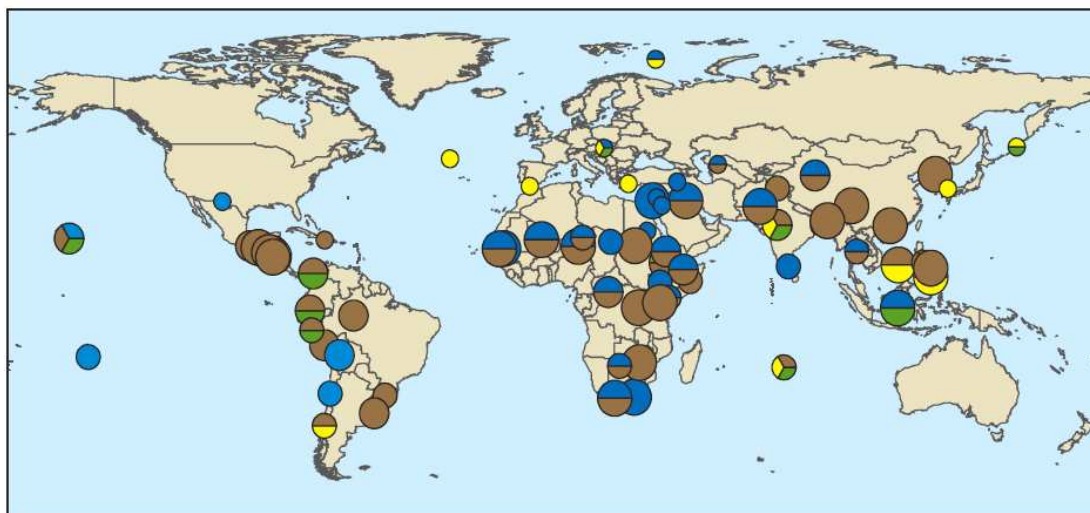


# Biziraupena auzitan ote dago?

- ✓ Gaurko bizimoduak ezin iraun
- ✓ Askoren biziraupena arriskuan
- ✓ Gure biziraupena ere arriskuan:
  - Ekosistemen zerbitzuak galdu
  - Ingurumen gatazka gehiegi mundu nuklearrerako



Map 1.1: Environmental conflicts



## Conflict intensity

- Diplomatic crisis
- Protests (partly violent)
- Use of violence (national scope)
- Systematic/collective violence

## Conflict cause

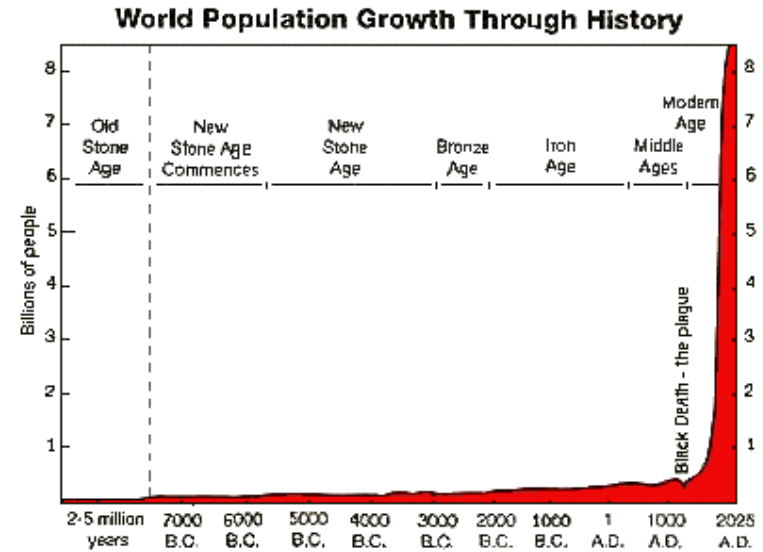
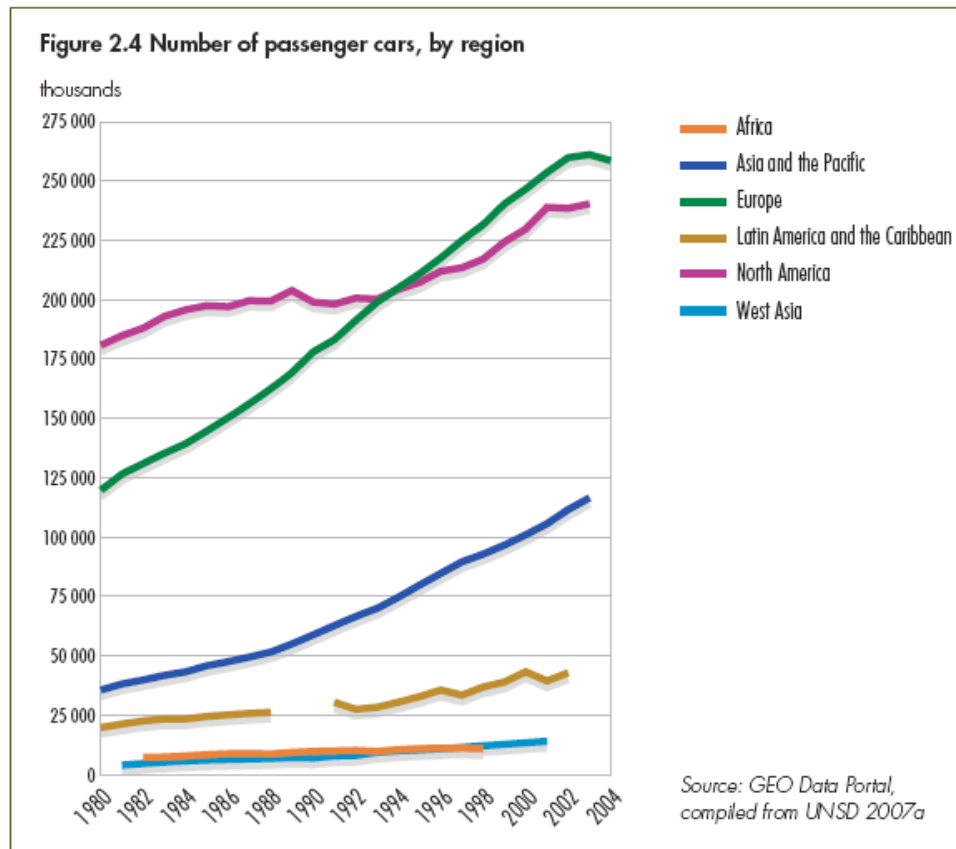
- Water
- Land/soil
- Fish
- Biodiversity

Source: WBGU, 2008



# Arazoaren jatorria

- ✓Giza-populazioa gora
- ✓Pertsona bakoitzaren kontsumoa gora

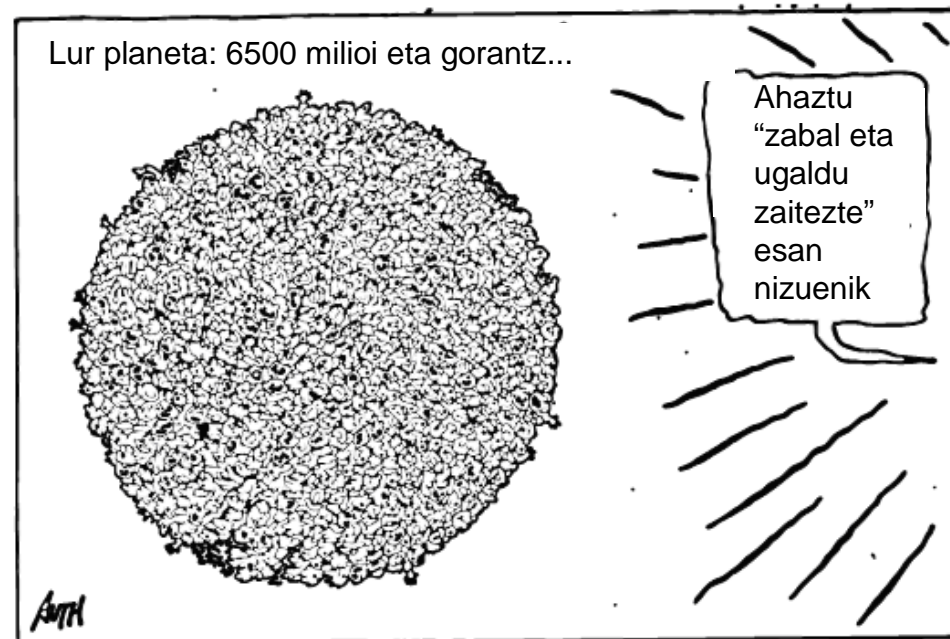


Roadkill

# Arazoaren jatorria

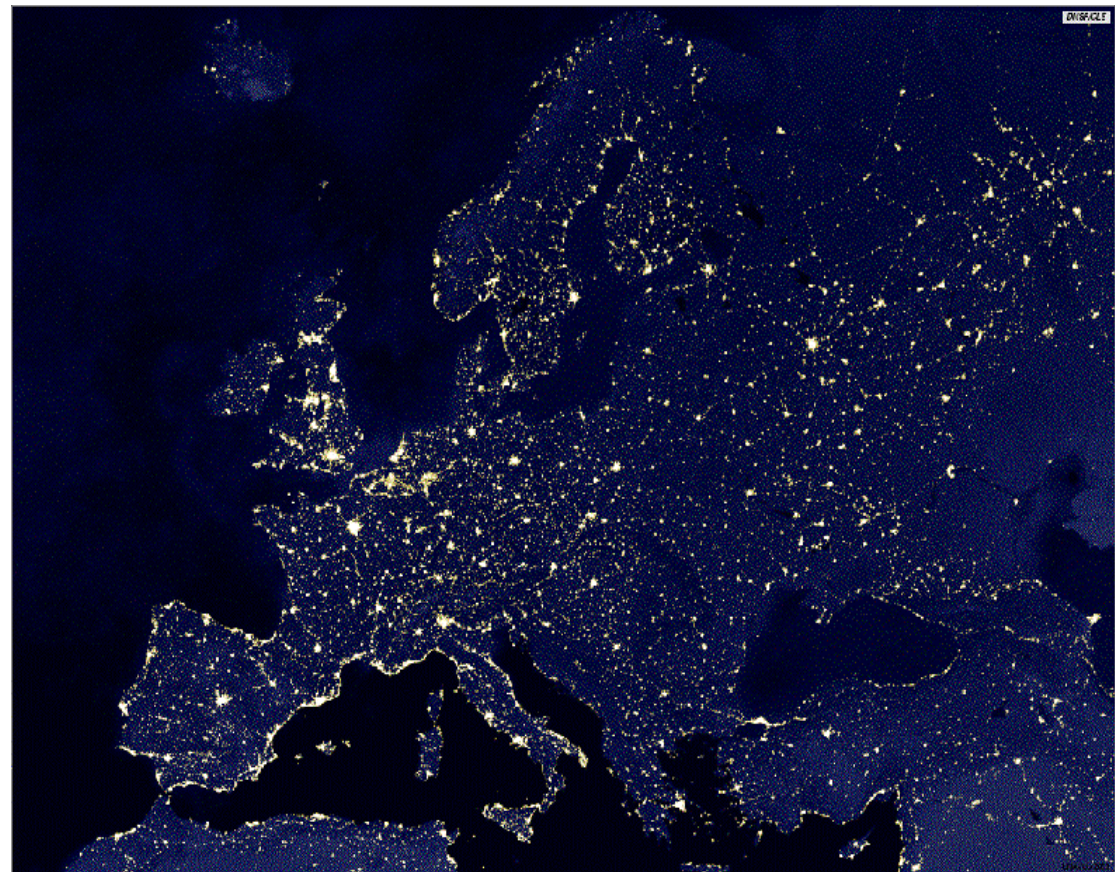
- ✓Giza-populazioa gora
- ✓Pertsona bakoitzaren kontsumoa gora

=>Dentsitate baxutan jasagarria dena  
dentsitate altutan jasanezin



# Lur erabilpenaren aldaketak

- ✓ Habitat naturalak desagertu
- ✓ Espezieak suntsitu
- ✓ Lurraren erabilpena intentsifikatu
- ✓ Leku asko gainustiatu
- ✓ Basamortutzea bultzatu
- ✓ Zerbitzu ugari galdu
  
- ✓ Mehatxatuenak:
  - ✓ Padurak
  - ✓ Mangladiak
  - ✓ Koral arrezifeak
  - ✓ Oihan tropikalak
  - ✓ Larre epelak
  - ✓ ...





# Lur erabilpena Euskal Herrian



1857



2006

**Nerbioi ibaiaren bokalea**



≈ 1900



≈ 2000

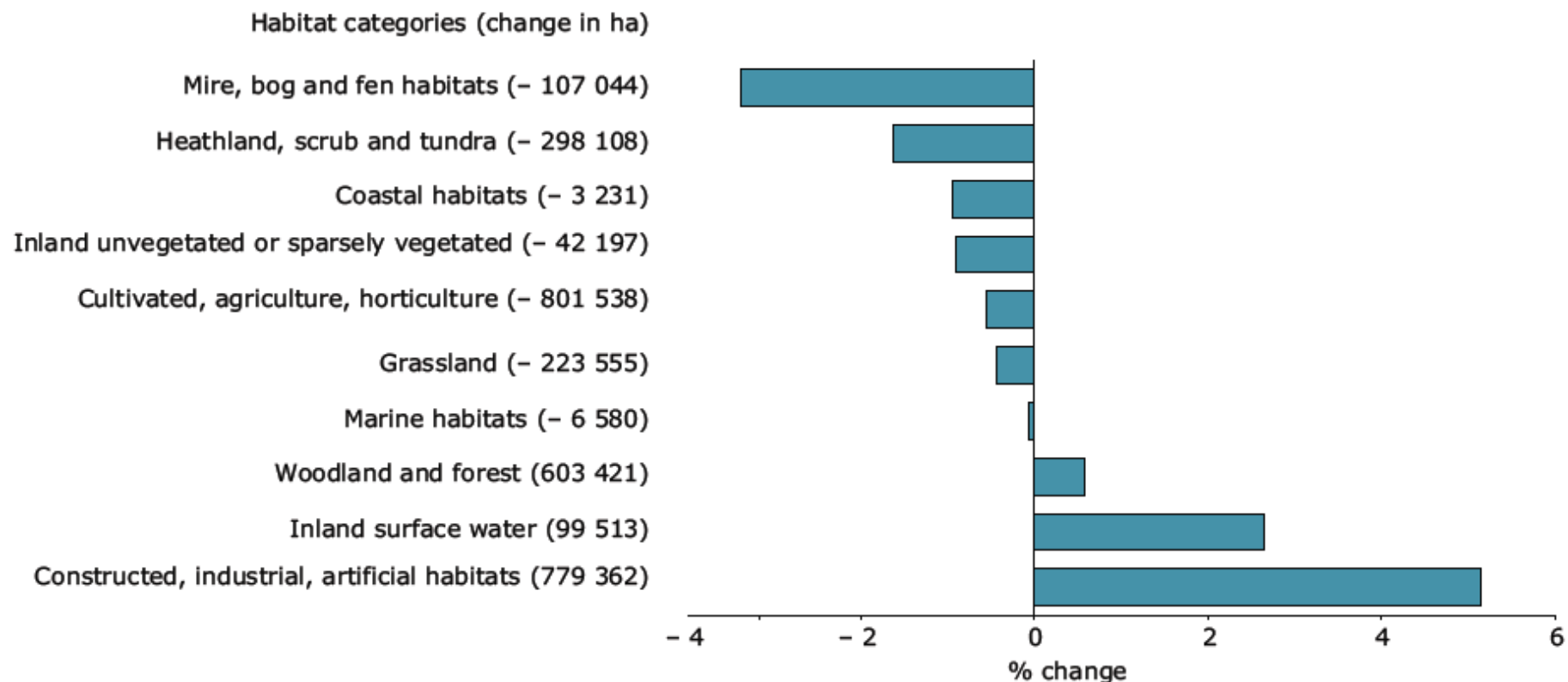
**Arratia**



# Lur erabilpena European

**Figure 4.4** Main land-cover changes from 1990–2000

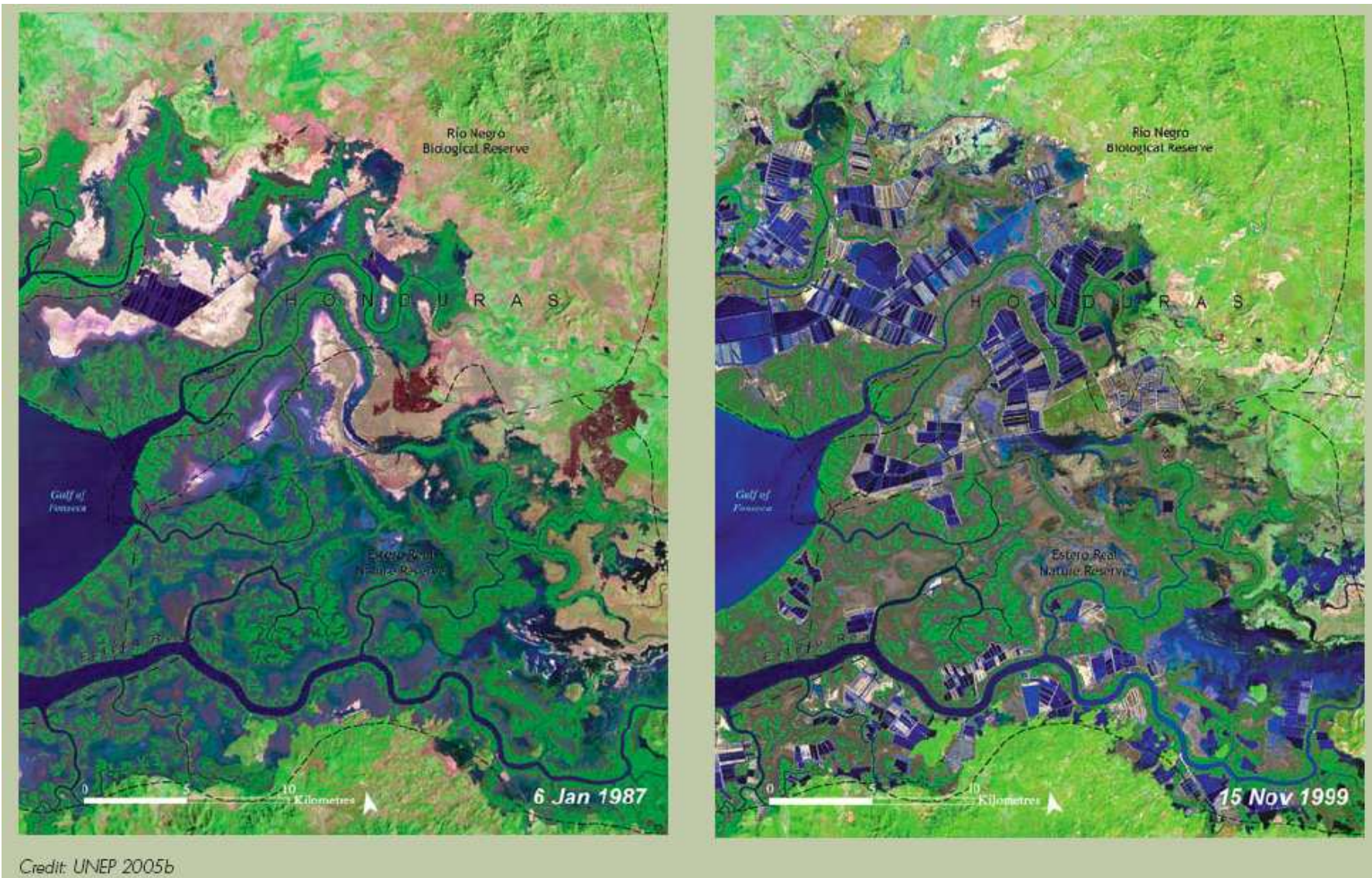
## Changes in coverage of EUNIS 10 main habitat types from 1990 to 2000



**Note:** Coverage: EU-25 excluding Finland, Sweden, Cyprus, Malta.

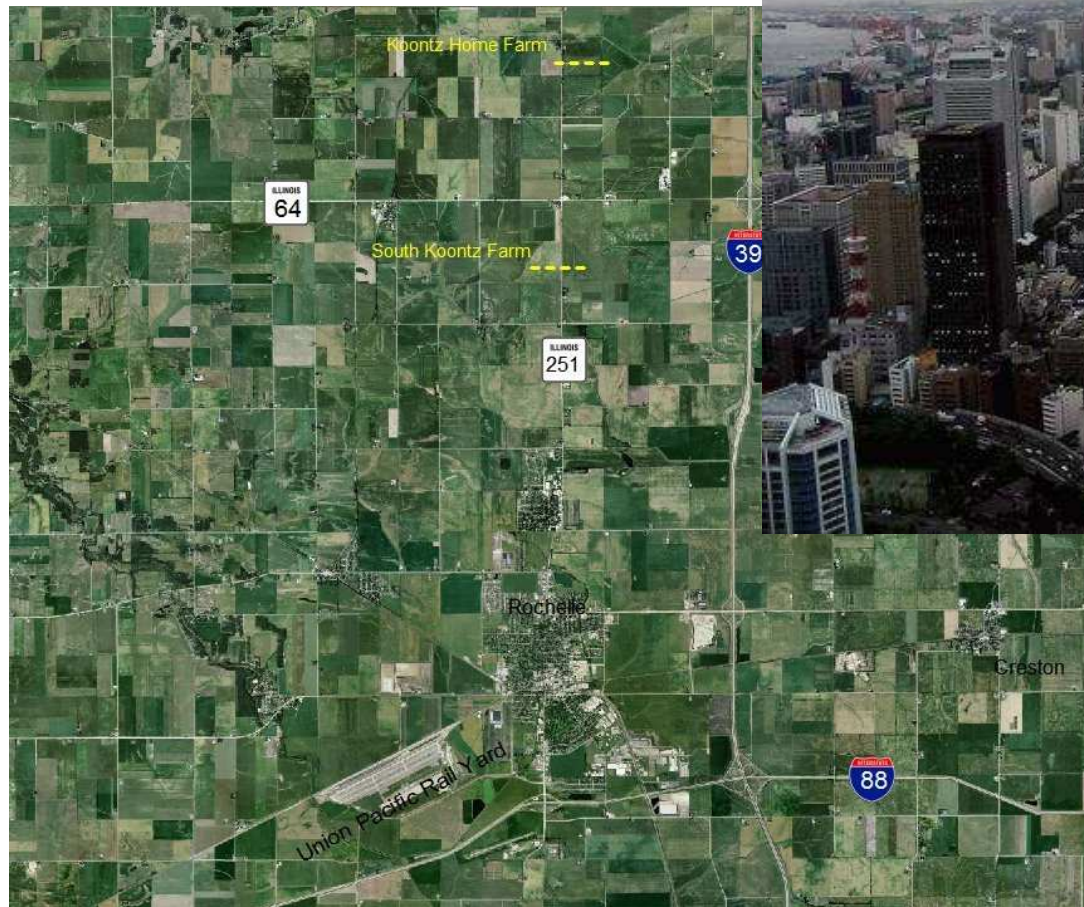
**Sources:** EEA, 2005; EUNIS database.

# Aldaketa ASKOZ azkarragoa Europatik kanpo



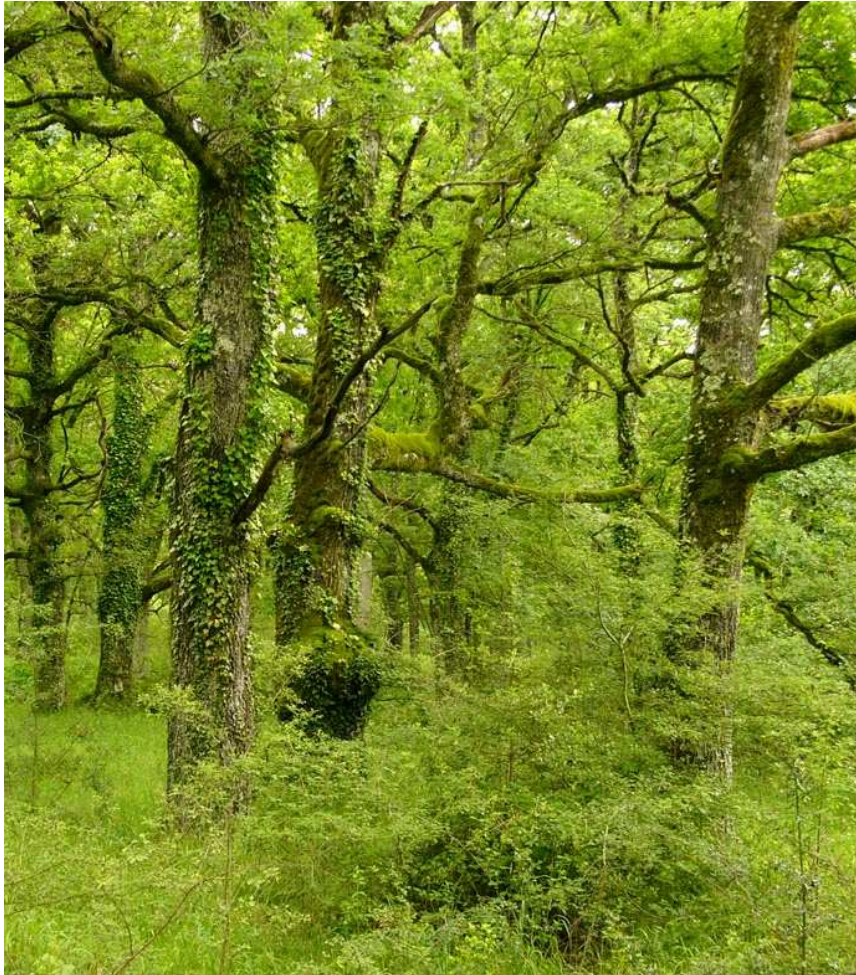


# Aldaketa ASKOZ azkarragoa Europatik kanpo





## Basoa bai, baina nolakoa?



Orgi



Erdoizta

Tratamendua	Mat. Org. (%)	Lurgaineko isurketa (L/m <sup>2</sup> )	Lur galera (Tm/ha)
Baso heldua	6.9	---	---
Arina	4.9	301	9
Ertaina	4.0	605	45
Gogorra	2.2	749	102

Edeso *et al.*, (2000)





# Eukaliptadiak Euskal Herrian



Erreka	Ornogabeak IBMWP	Kalitatea	Funtzionamendua k <sub>r</sub> /k <sub>D</sub>
1D	225	I	
1E	267	I	<b>0.91</b>
2D	177	I	
2E	152	I	<b>0.53</b>
3D	222	I	
3E	190	I	<b>0.30</b>
4D	190	I	
4E	174	I	<b>0.17</b>
5D	220	I	
5E	181	I	<b>0.17</b>



Egokia

Eskasa

Oso Txarra

Gessner & Chauvet, 2002. *Ecol. Appl.*

Deskonposizioa % 60 geldoago



# Lurraldearen antolaketa desegokia

Planifikazio faltak arrisku ugari dakartza



Reinosa 2006

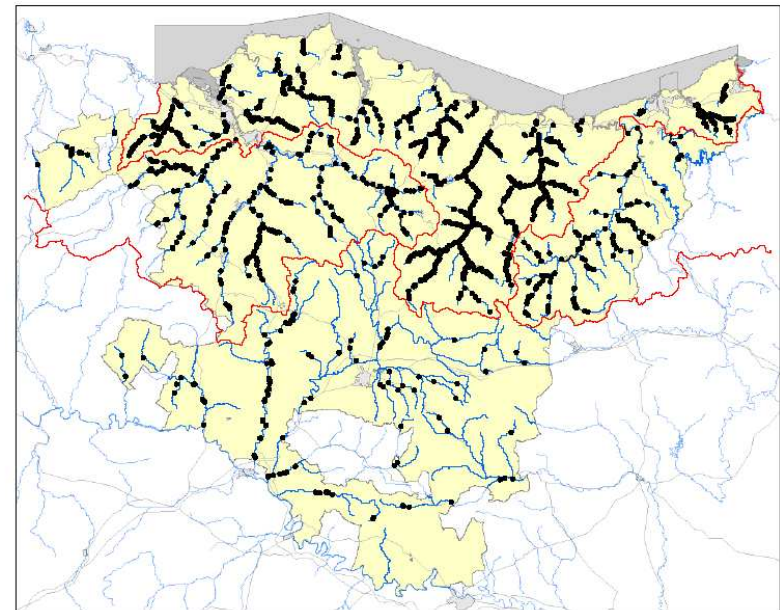
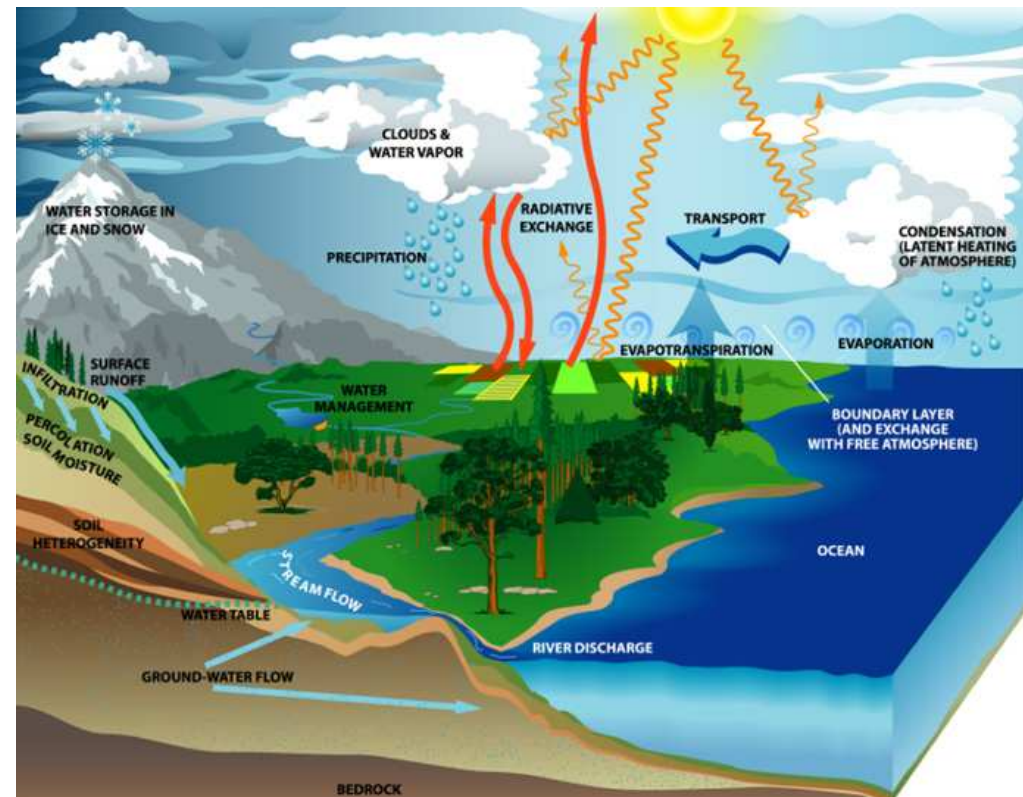


Figura 33 Ubicación Defensas frente a inundaciones. Masas de agua de la categoría río

# Ziklo biogeokimikoen aldaketak

Giza jarduerak ziklo biogeokimikoak aldatu  
Aldaketa horiek globalak  
Biosfera osoan eragina  
Ondorio zuzenak ongizatean

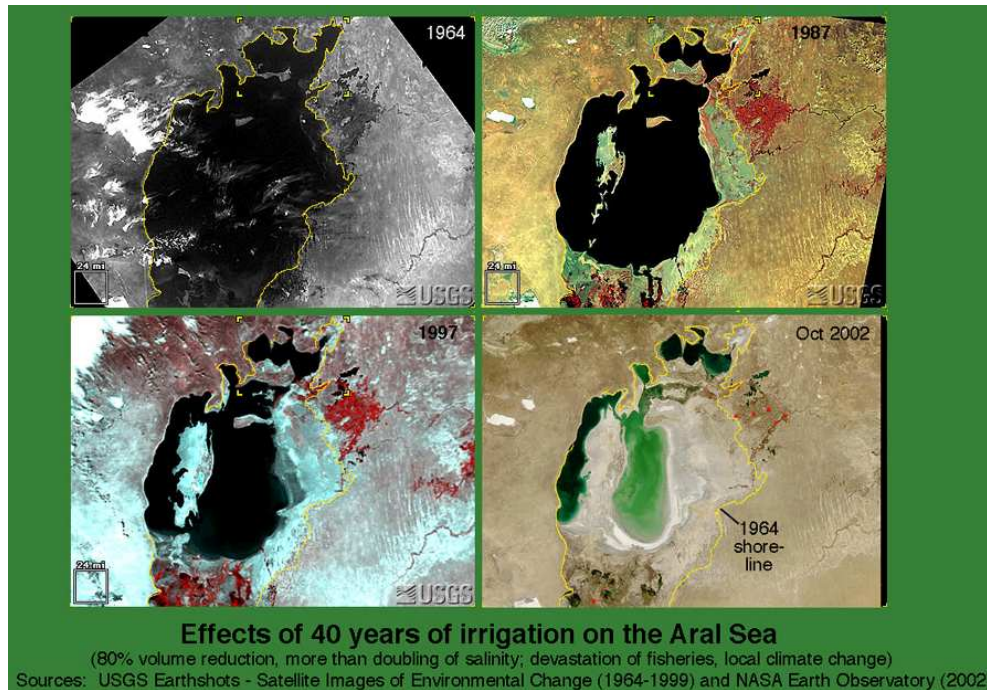


Uraren zikloa



# Uraren zikloa

## Uraren gehiegizko ustiaketa



Para ver esta película, debe disponer de QuickTime™ y de un descompresor TIFF (sin comprimir).

## Arroen erantzun hidrológicoa



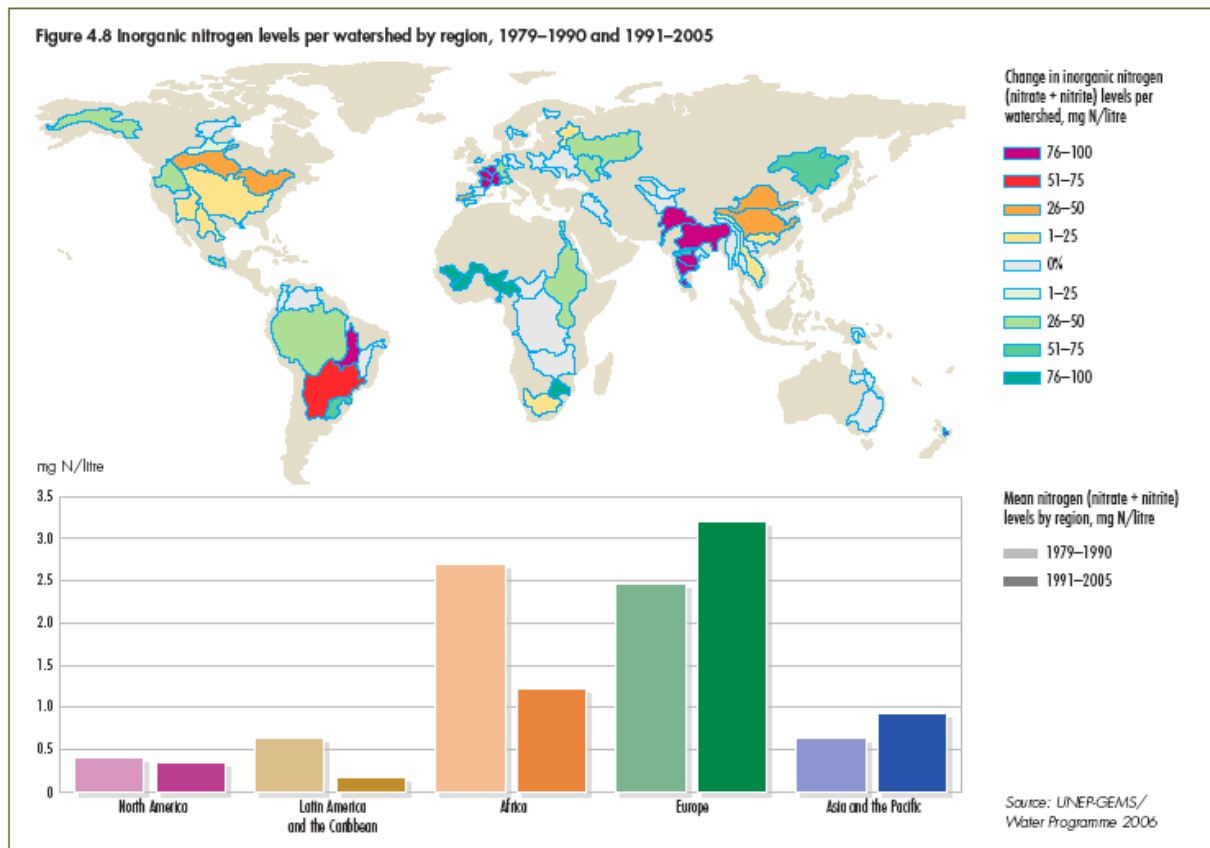


# Mantenugaien zikloak

N eta P (ongarriak) => **eutrofizazioa**



# Nitrogenoaren arazoa



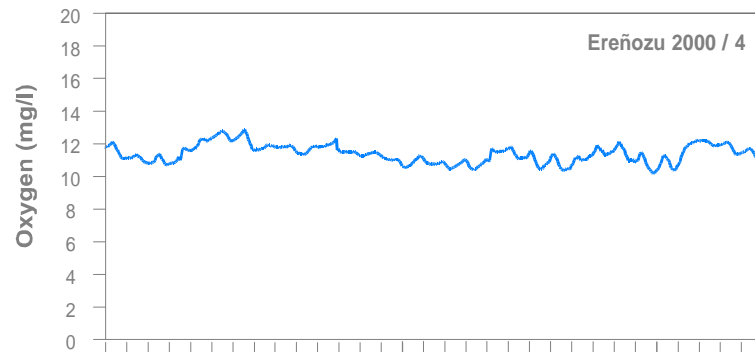
**Figure 2.3.16 Percentage of river monitoring stations per country reporting increasing (upward) or decreasing (downward) trends in nitrate concentrations (1992 to 2004)**



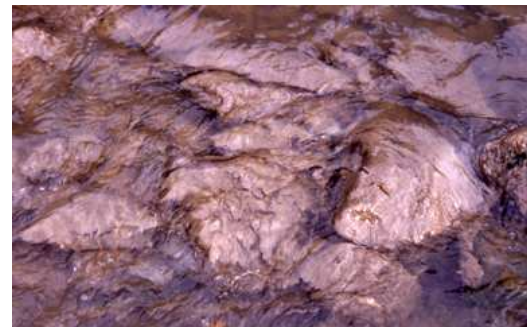
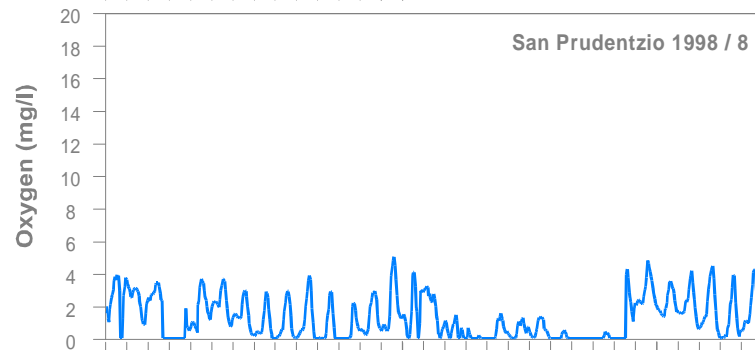
**Note:** Negative values on 'y' axis equate to decreasing trends, positive values increasing trends. Analysis based on representative river monitoring stations except for Norway where flux monitoring stations were used.

**Source:** EEA CS120.

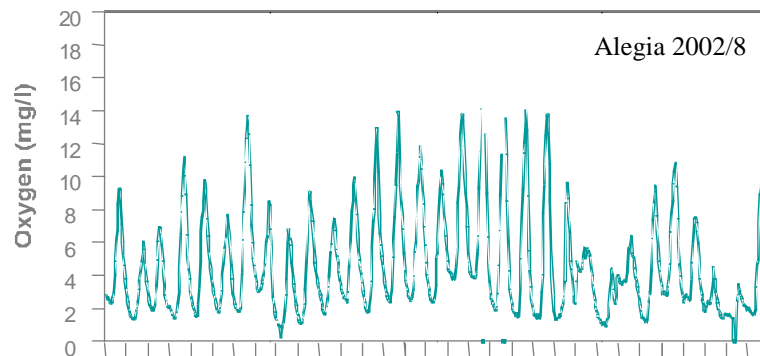
# Eutrofizazioa eta ekosistemen funtzionamendua



Ekoizpena: 1.74  
Arnasketa: 16.98



Ekoizpena : 5.32  
Arnasketa: 81.39



Ekoizpena: 16.08  
Arnasketa: 21.68

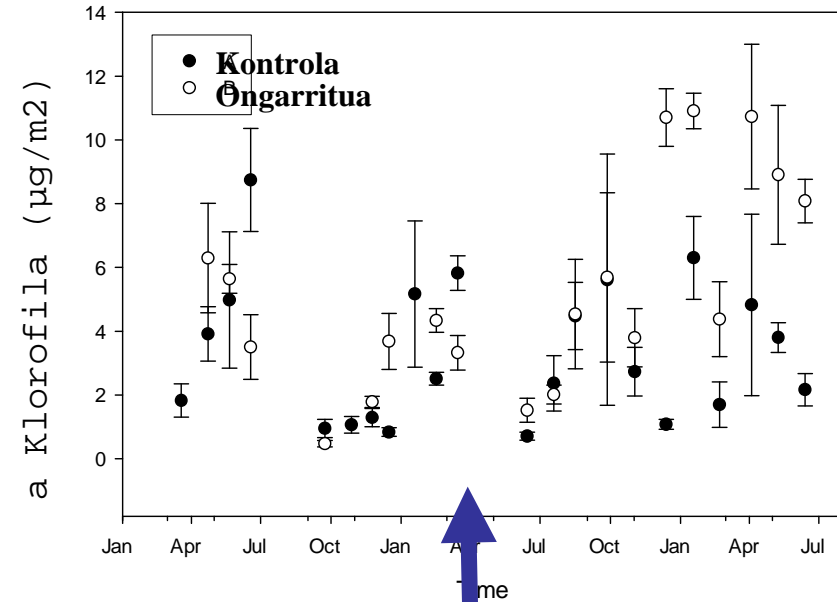
$\text{gO}_2/\text{m}^2\text{egun}$



# Eutrofizazioaz gehiago ikasten



Fuirosos (Girona)



Ongarritzen  
hasi



**Cambios globales  
en sistemas fluviales**

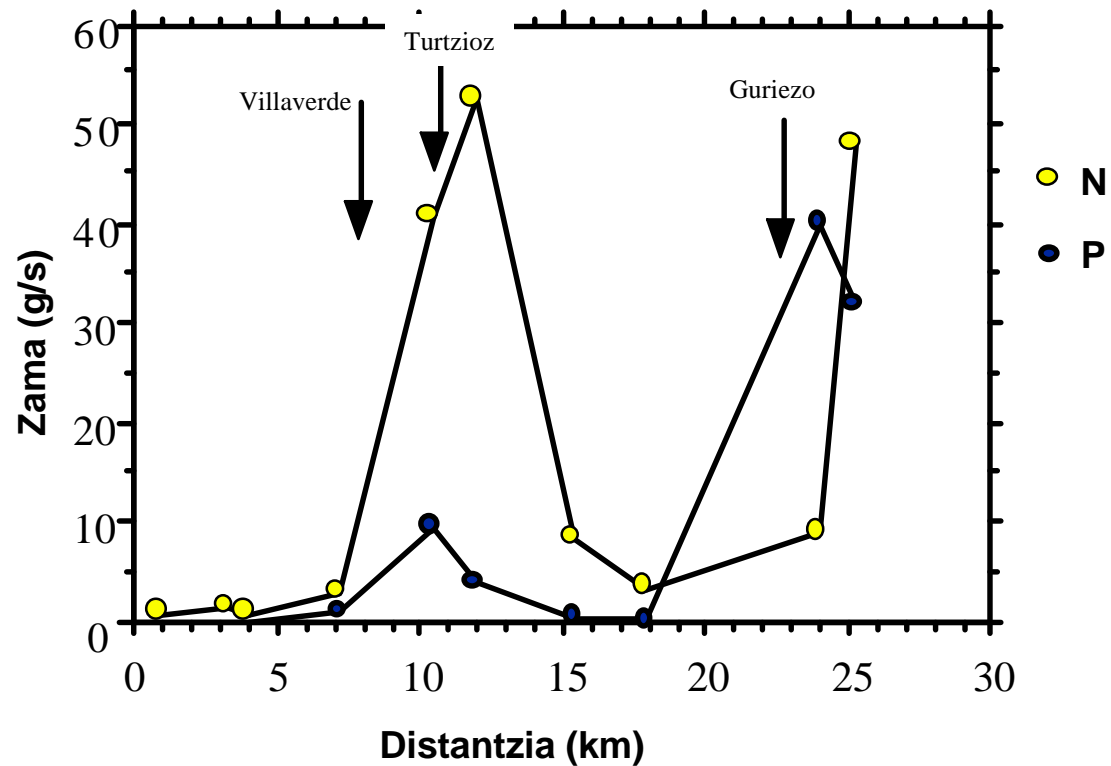
efectos sobre la biodiversidad,  
la red trófica y el funcionamiento del sistema

Fundación **BBVA**





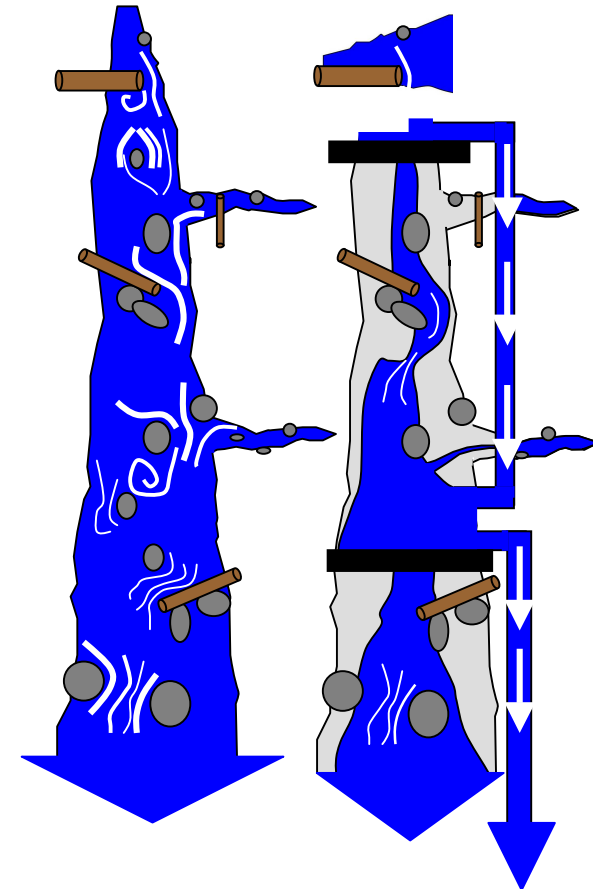
## Ibaiak, araztegirik onenak...



Agüera ibaia, 1990-7-25

Elosegi & Diez 1999

## ...batzutan



metatool 

Metabolism as a tool to  
assess stream impairment

	Q (%)	P atxekimendua	P sarrera (%)	P irteera (%)
Erreka naturala	100	1,742	100	17,5
Erreka presapean	1	8,621	1	0,0
Ubidea	99	0,862	99	41,8

Izagirre et al., bidalia.



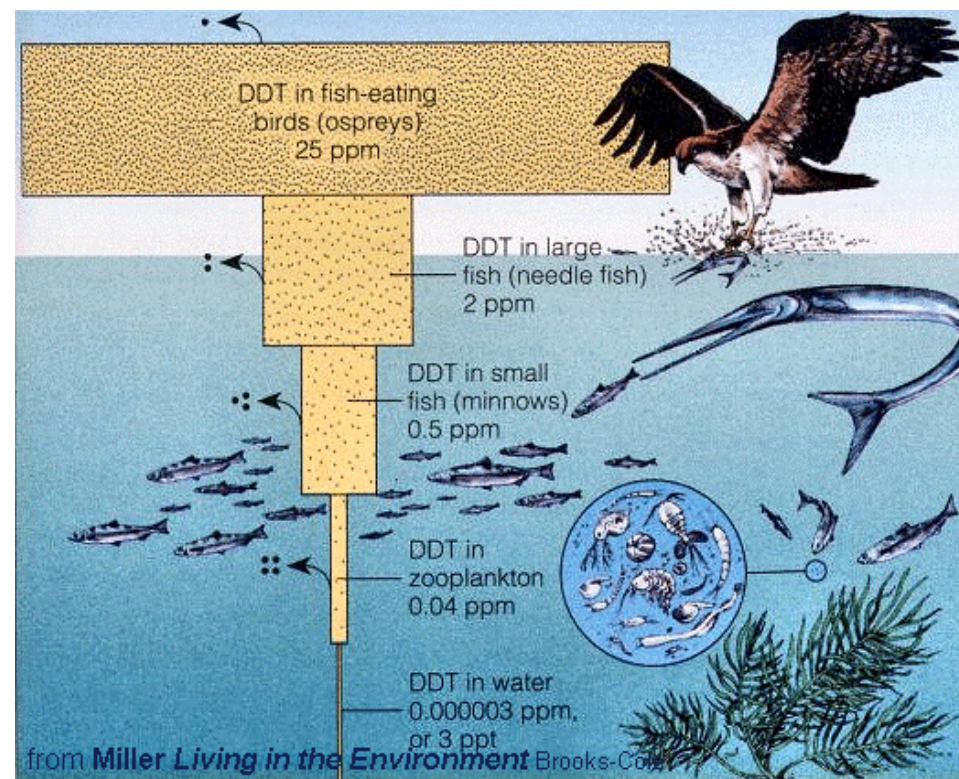
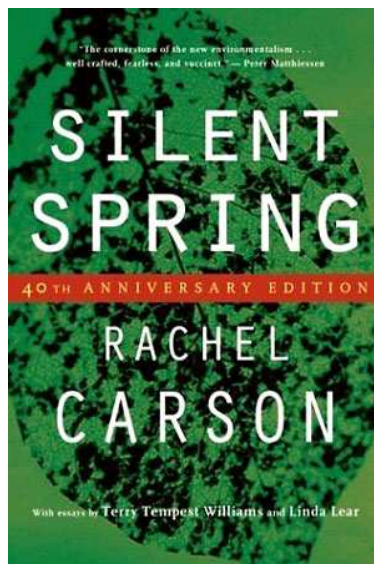
# Poluzioa

Aspaldiko kontua  
Baina gero eta konplexuagoa

≈ 18 000 000 substantzia sintetiko  
≈ 600 pestizida  
≈ 3300 botika

Poluzioaren gaineko ikuspuntua

- <1950: Toxizitate zuzena
- 1950-60: Biometatzeko joera
- 1960-90: Mutagenizitatea



# Poluzioa

Aspaldiko kontua  
Baina gero eta konplexuagoa

Poluzioaren gaineko ikuspuntua

- <1950: Toxizitate zuzena
- 1950-60: Biometatzeko joera
- 1960-90: Mutagenizitatea
- 1990-2000: Mugikortasuna
- >2000: Disrupzio hormonalak

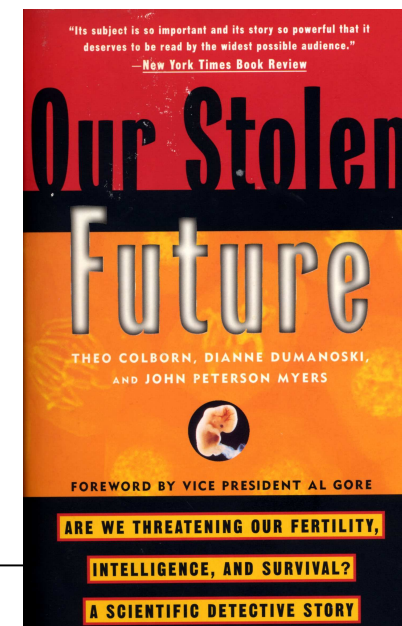
**Table 2.** Organochlorine concentrations in human milk from Inuit and Caucasian women (ng/g, lipid basis)

Organochloride compounds	Inuit women (N = 107)		Caucasian women (N = 50)	
	n <sup>a</sup>	Mean <sup>b</sup> ± CI	n	Mean ± CI
DDE	107	1212 ± 170	50	336 ± 18
Hexachlorobenzene	107	136 ± 19	48	28 ± 3
Dieldrin	102	37 ± 5	46	11 ± 1
Mirex	90	16 ± 4	3	1.6 ± 0.3
Heptachlor epoxide	45	13 ± 2	29	8 ± 1
Trans-chlordane	18	3.7 ± 0.4	0	<6
Endrin	1	<8	0	<6

<sup>a</sup>n = number of milk samples with concentration above the detection limit.

<sup>b</sup>Arithmetic mean and 95% confidence interval; when more than one sample contained a nondetectable concentration, the arithmetic mean and the confidence interval were computed by log-probit regression (18).

Dewailly *et al.*, 1993. *Environ. Health Persp.*





# Poluitzaileak ibaietan



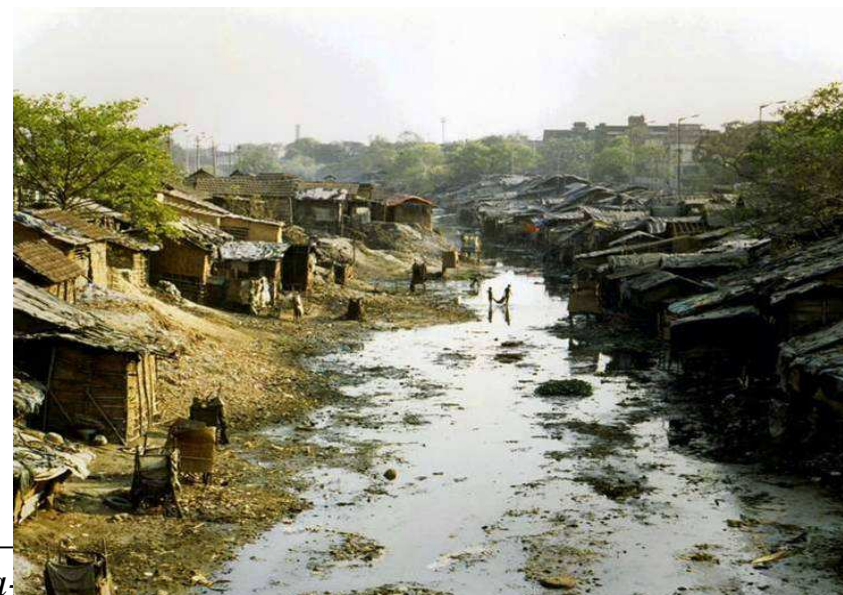
Botiken kontzentrazioak ibai-uretan

Substantzia	Mota	Kontzentrazioa	Non
Azido azetilsaliziliko	Analgesikoa	0,36 µg/L	Alemania
Ziprofloxacina	Antibiotikoa	0,02 µg/L	EEBB
17αEtinilestradiol	Hormona	0,45 µg/L	Alemania
Testosterona	Hormona	0,12 µg/L	EEBB

Bila & Dezotti, 2003. *Quim. Nova*

“Urari loturiko gaitzek eragiten dituzte gaixotasunen eta heriotzen % 80 garapen bidean diren herrialdeetan, eta zortzi segunduro haur bat hiltzen dute”.

UNEP, 2006



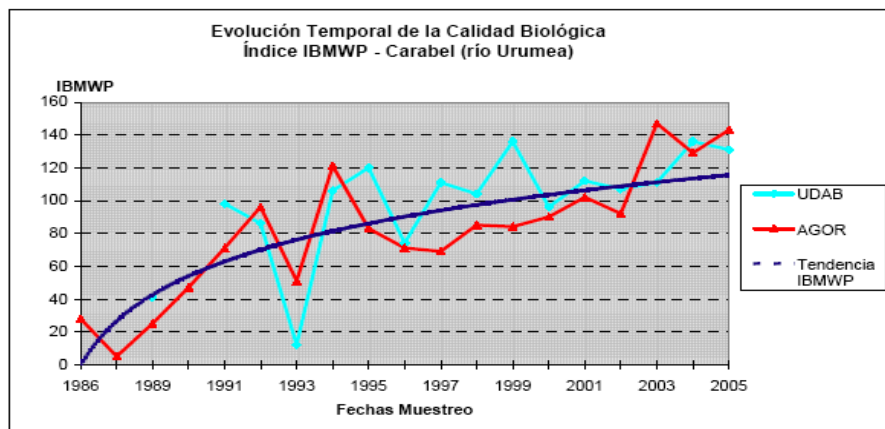
# Poluzioa Euskal Herrian



Tolosa ≈ 1960



Tolosa gaur



Gipuzkoako Foru Aldundia. 2006.

Poluzioak behera,  
baina ibaiak ez dira uste adina errekuperatu

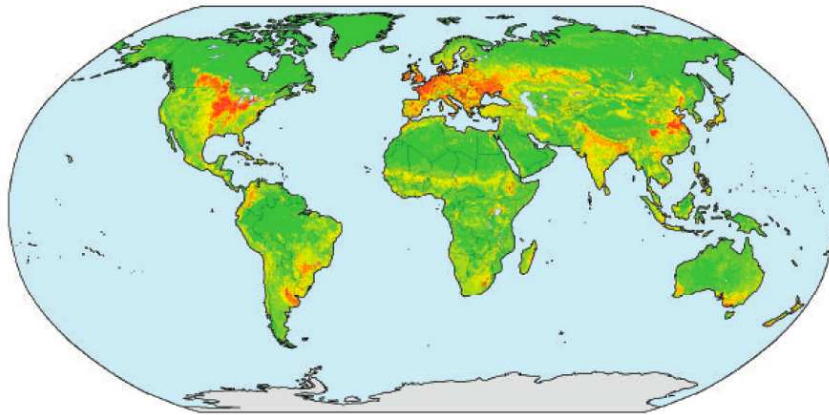
Funtzionalitatea galtzen?





# Biodiversitatearen galera

Map 2.3: Mean species abundance 1970 (MNP/OECD 2007)



Map 2.6: Mean species abundance 2050 (MNP/OECD 2007)

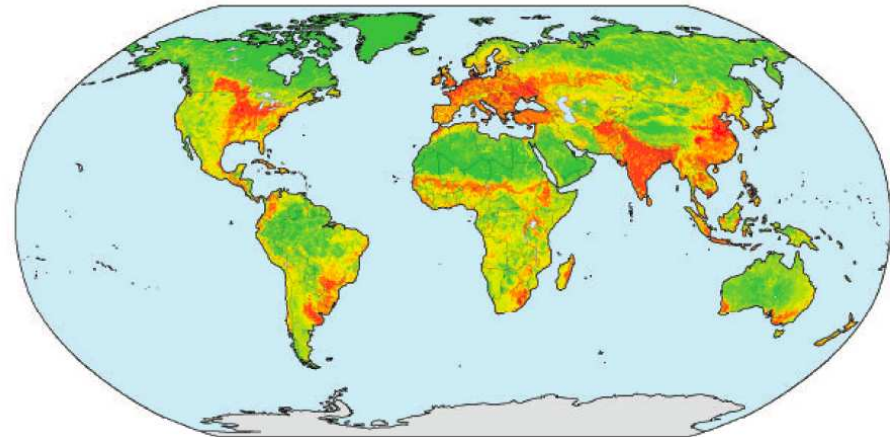
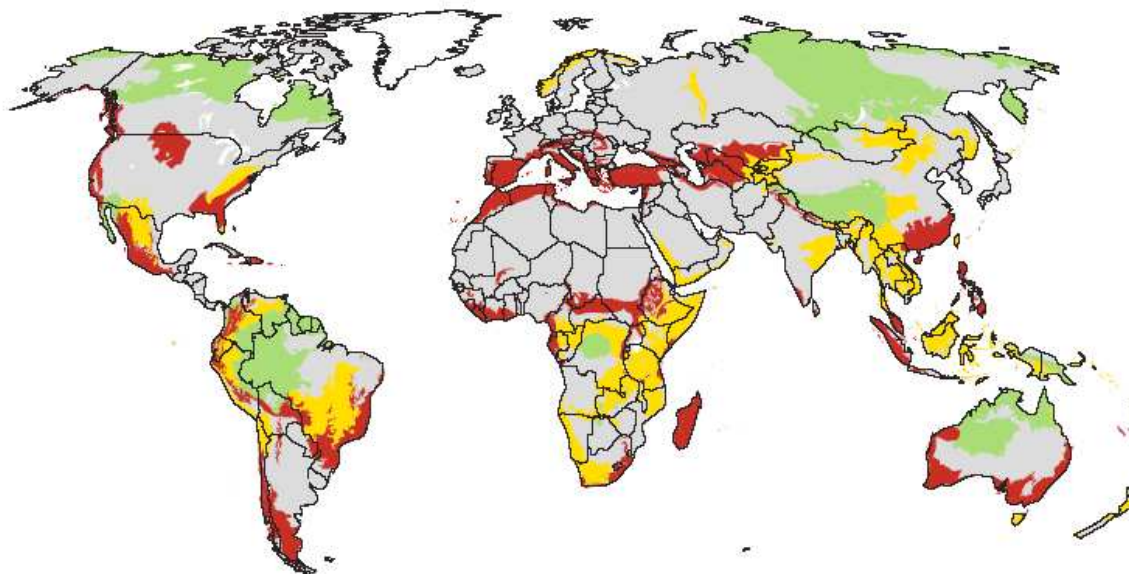


Figure 5.1 Status of terrestrial ecoregions

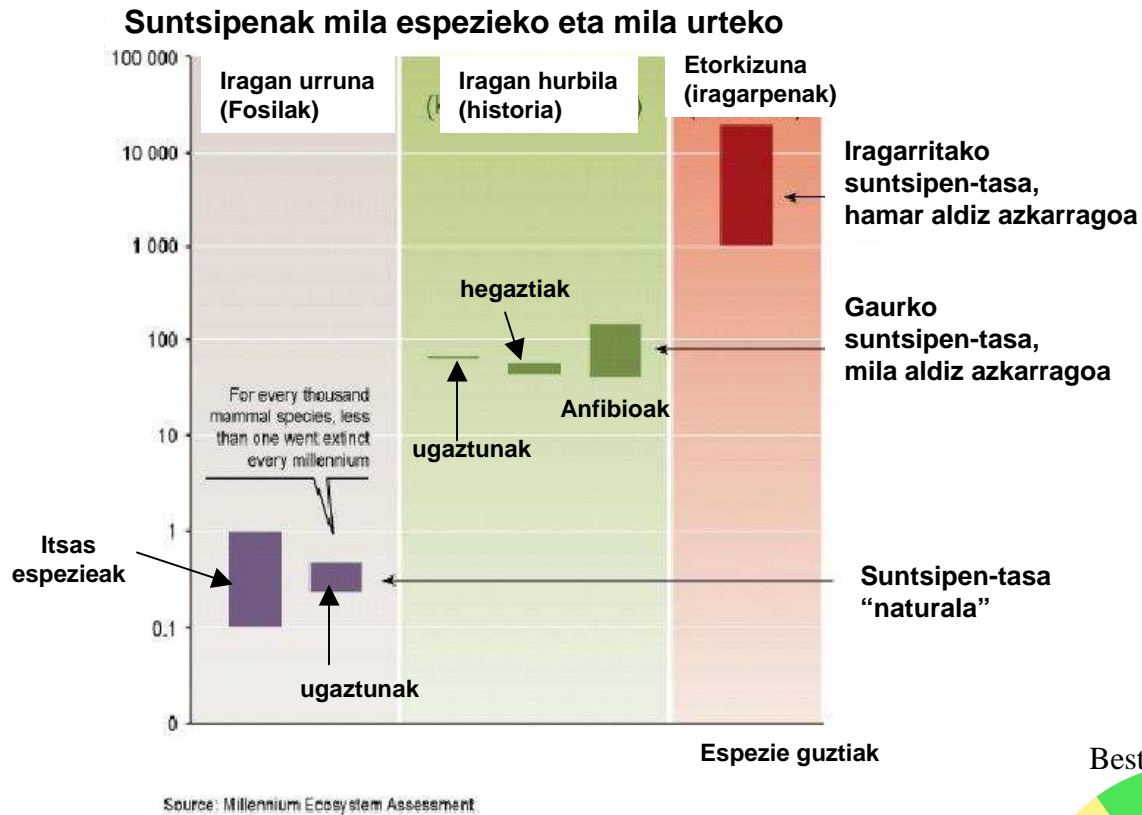


- Critical or endangered
- Relatively stable or intact
- Vulnerable
- Ecoregions with no ongoing threat

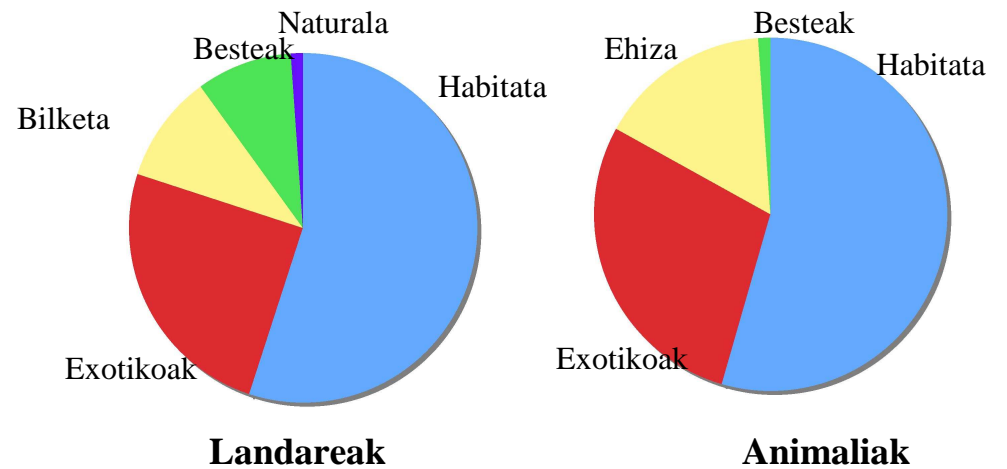
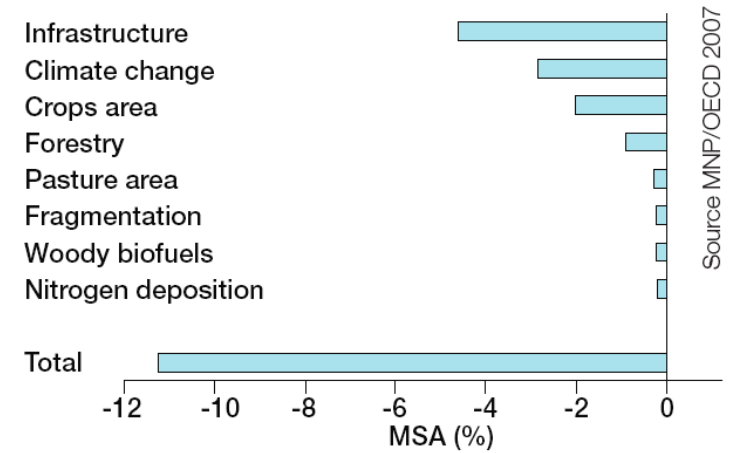
Note: An ecoregion is a large unit of land containing a geographically distinct assemblage of species, natural communities, and environmental conditions.

Source: WWF 2006

# Suntsipen-tasa



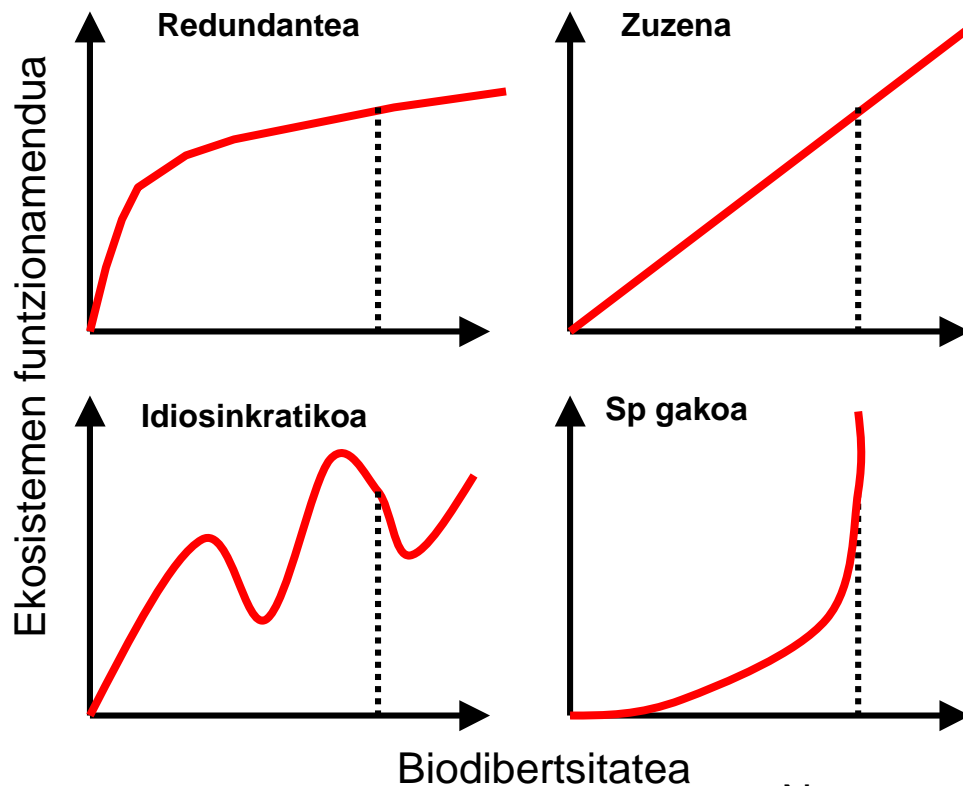
**Figure 2.3: Global biodiversity (MSA) loss 2000-2050 and contribution of pressures**



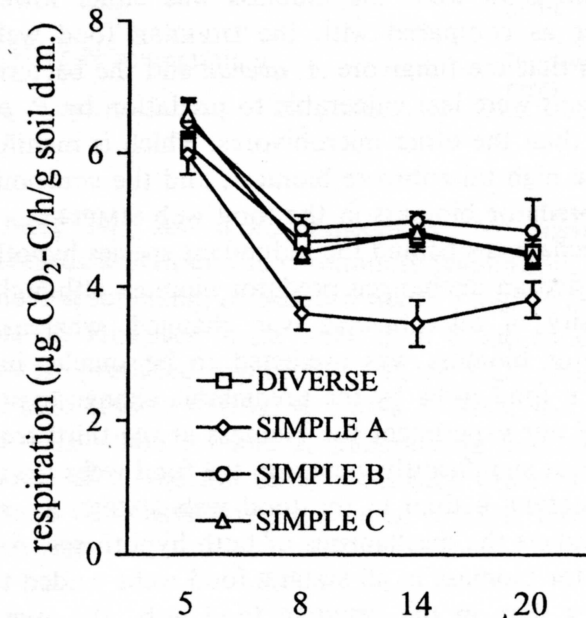


# Suntsipenen ondorioak

Biodibertsitate/zerbitzu erlazioa



Naeem *et al.*, 2002



Lurzoru-laginen arnasketa-tasa animalia dibertsitatearen arabera (Mikola & Setälä, 1998)

# Konplexutasun fisikoa erreketan

Konplexutasuna berreskuratzen Añarbeko errekan



Olin, 330 m<sup>3</sup> egur/ha



Latxe, 2 m<sup>3</sup> egur/ha

COMPLEXTREAM

Effects of channel complexity

on stream ecosystem structure & functioning

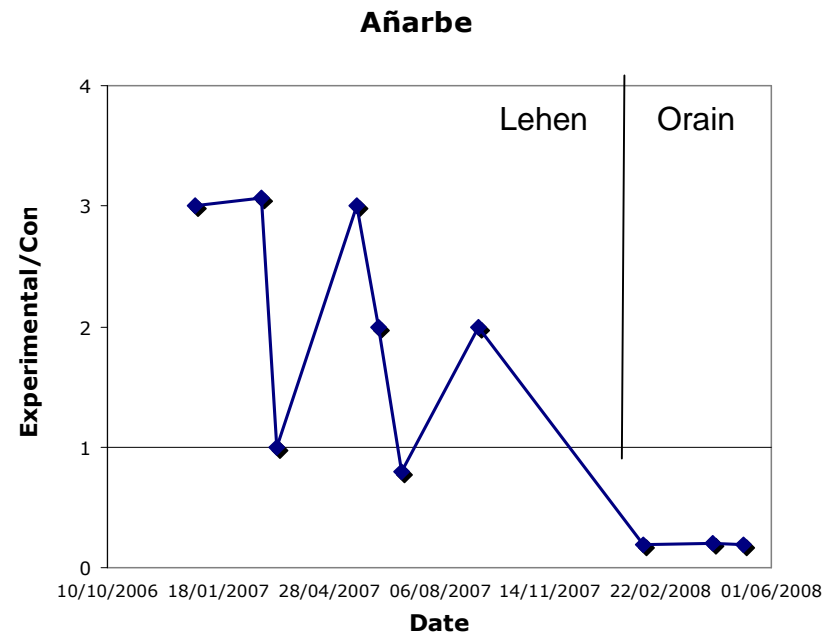


# Konplexutasuna eta funtzionamendua

Konplexutasuna berreskuratzen Añarbeko errekan



COMPLEXTREAM  
Effects of channel complexity  
on stream ecosystem structure & functioning





# Konplexutasunaren abantailak



Añarbeko urtegia



2006-7-7



2008-2-9

Sedimentu sarrera: 123000 m<sup>3</sup>/u  
(urtegiaren % 0,28)



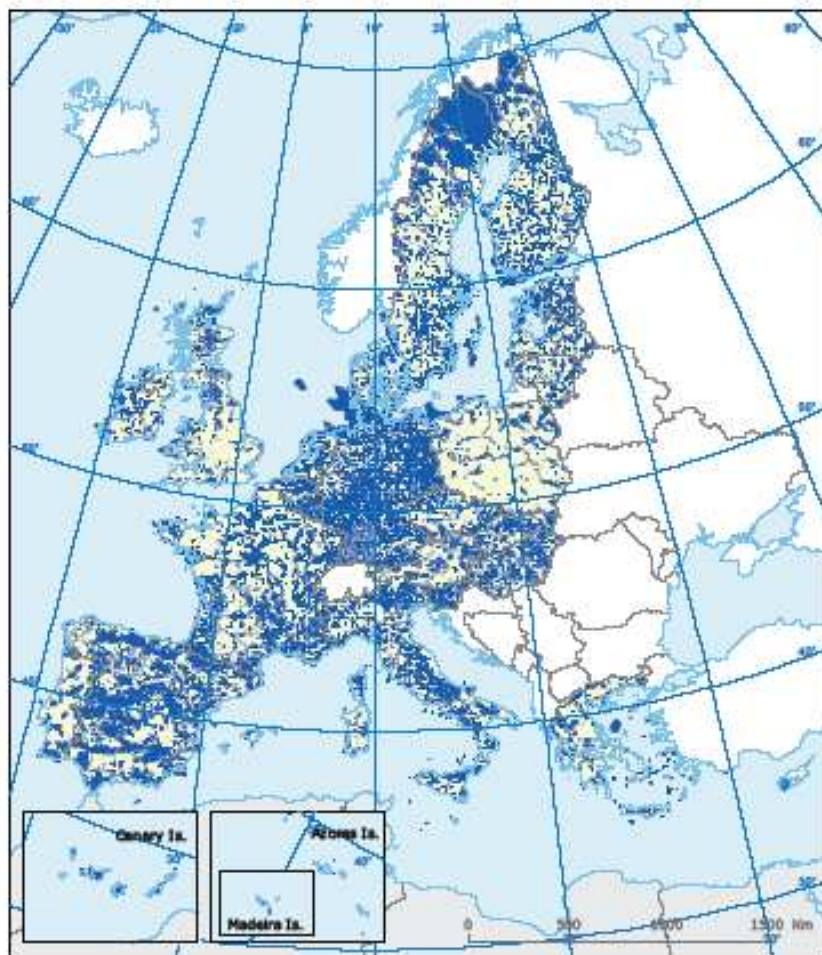
# Konplexutasun galdua

Ura garbi, baina hauek erreka al dira?  
Horrelakoak nahi al ditugu??



# Biodibertsitatea babesguneetan

Map 4.3 Distribution of Natura 2000 sites across EU Member States



**Distribution of Natura 2000 sites across EU-25**

- Natura 2000 sites
- Outside report coverage

Source: EEA-ETC/BD, December 2006.

Biodibertsitatea kontserbatzeko naturguneak ezinbesteko  
 Naturgune-sare zabala eratu dugu  
 Baina oraindik biodibertsitatean atzerantz goaz

Arrisku nagusia: administrazioa

"Papeles para el debate 1: Diagnóstico"  
 El escenario ideal de la Biodiversidad en el País Vasco.  
 ESTANDARES MÍNIMOS PARA LA CONSERVACIÓN DE LA BIODIVERSIDAD  
 Documento de debate para el Grupo de Trabajo de Humedales y Ríos



Estrategia de Biodiversidad de la CAPV, 2008-2015

Este documento que tiene en sus manos, es un material de trabajo que pretende servir como guía para orientar y dinamizar la reflexión individual de los asistentes al proceso de participación para la elaboración de la estrategia de Biodiversidad de la CAPV. A su vez, se espera sirva para facilitar el diagnóstico colectivo de la situación de la Biodiversidad en la CAPV.

Los estándares mínimos que se presentan y los subsiguientes criterios de valoración se han seleccionado a partir del análisis de los documentos estratégicos y normativa que actualmente se adoptan como marco de referencia en materia de política de conservación de la Biodiversidad.

Noviembre 2007

Equipo del proceso participativo para la elaboración de la Estrategia de Biodiversidad



## Izurri globalak



Lutxoa



Karramarro gorria



Moskito-arraina



Zebra muskuilua



Falopia

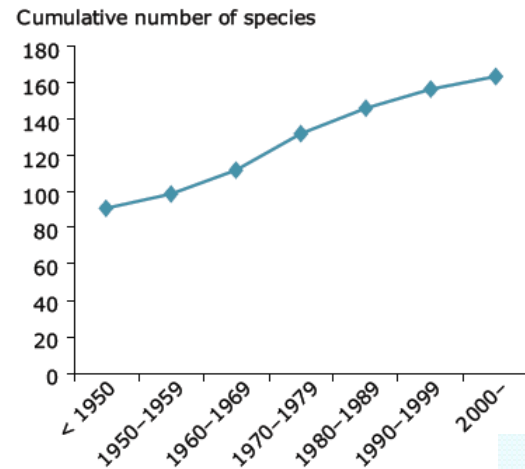


Panpa-belarra

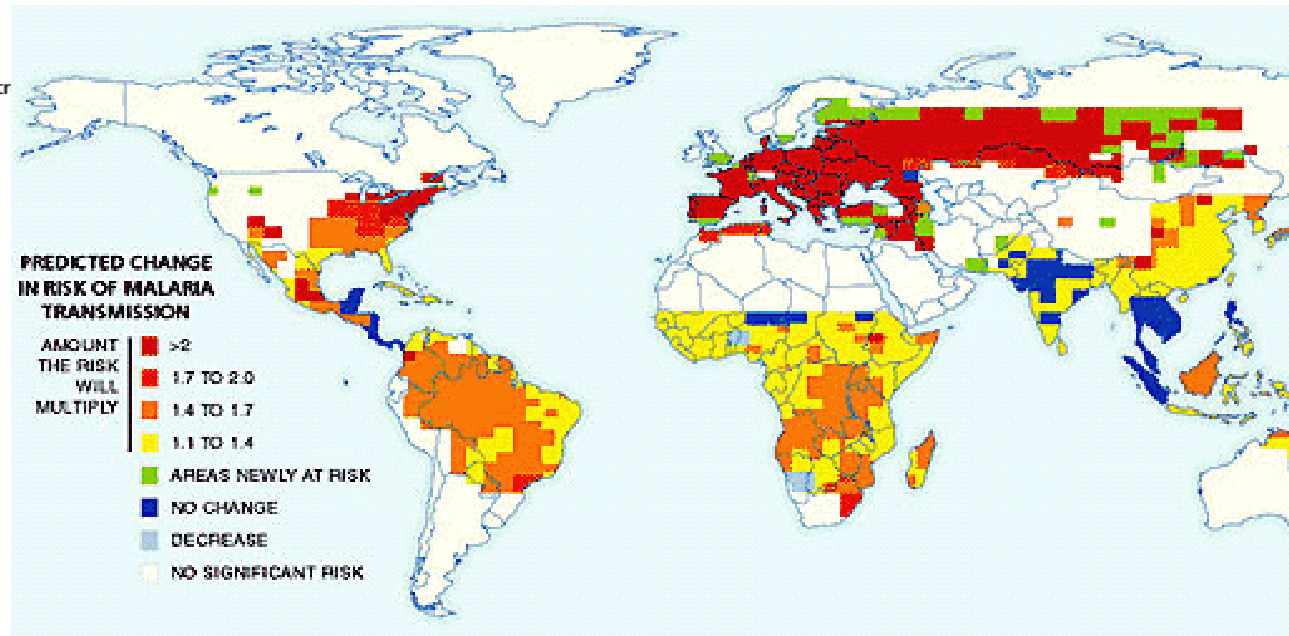
Exotikoak, arazo OSO larria  
Euskal Herrian ez diogu arretarik jartzen

# Izurri globalak

**Figure 4.11** Establishment in the pan-European region of the worst invasive alien species threatening biodiversity (all ecosystems)

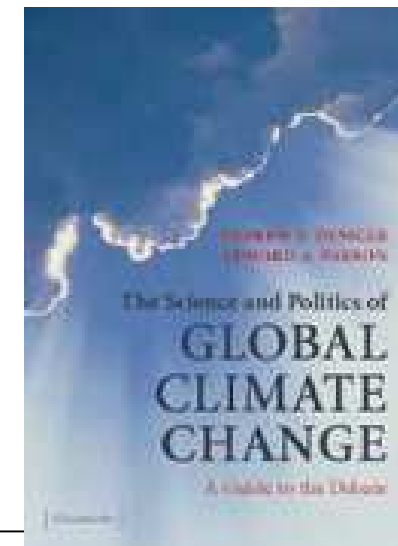
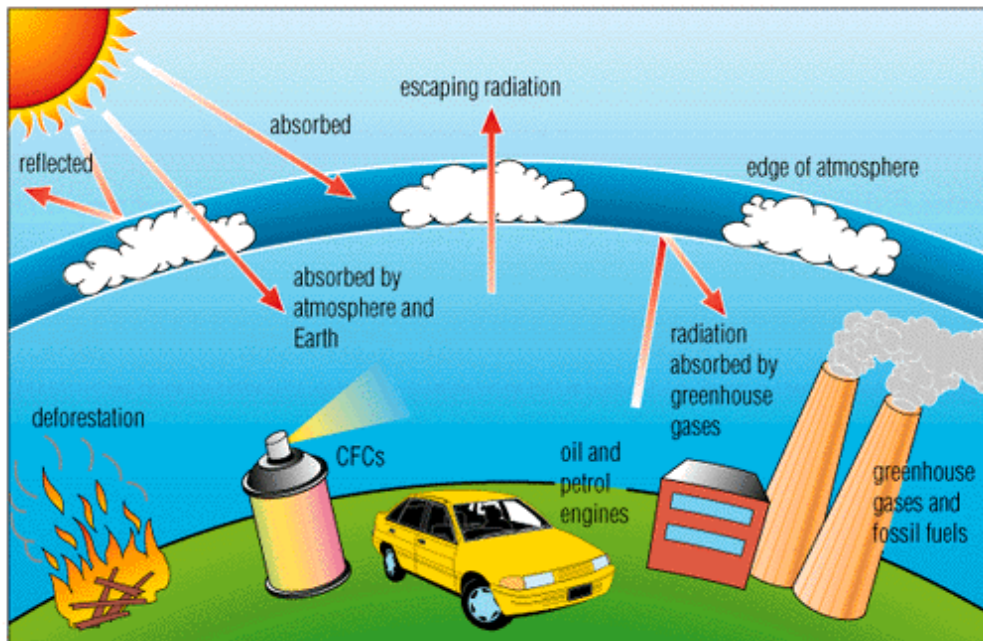
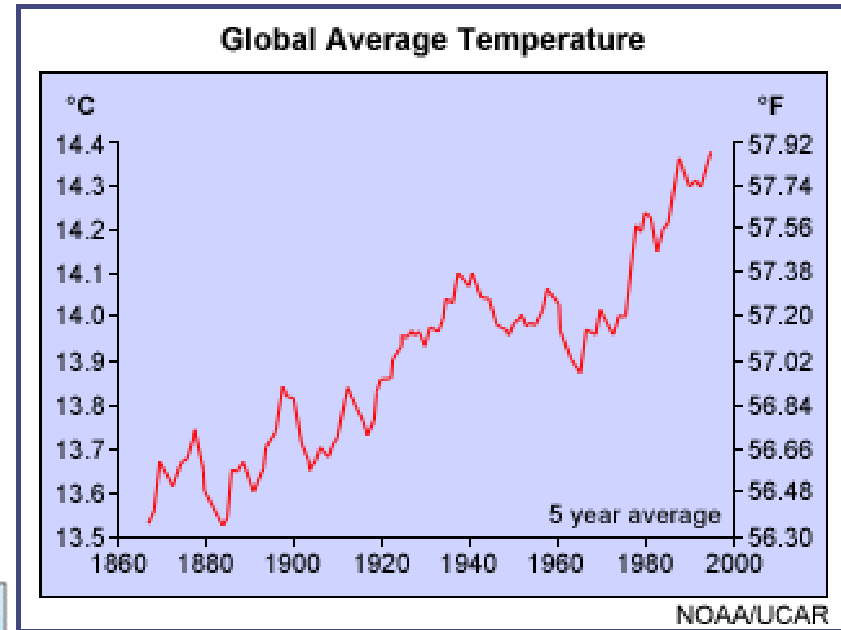
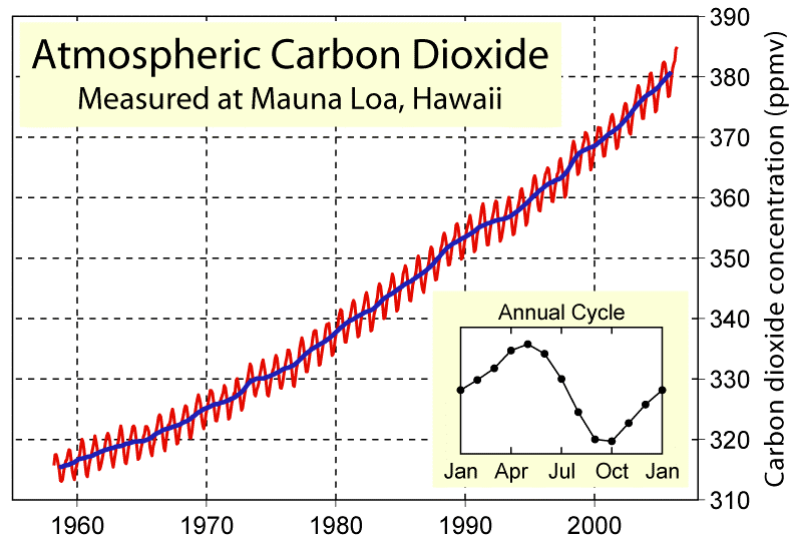


Source: EEA/SEBI 2010, 2007 Expert Group on tr alien species.





# Klima-aldaketa



## Klima-aldaketaz jendea konbentzitu duena

Global warming  
is occurring NOW



Munduan

Pues mi primo dice  
que los científicos  
no pueden predecir  
el tiempo de mañana,  
o sea que en 100 años...



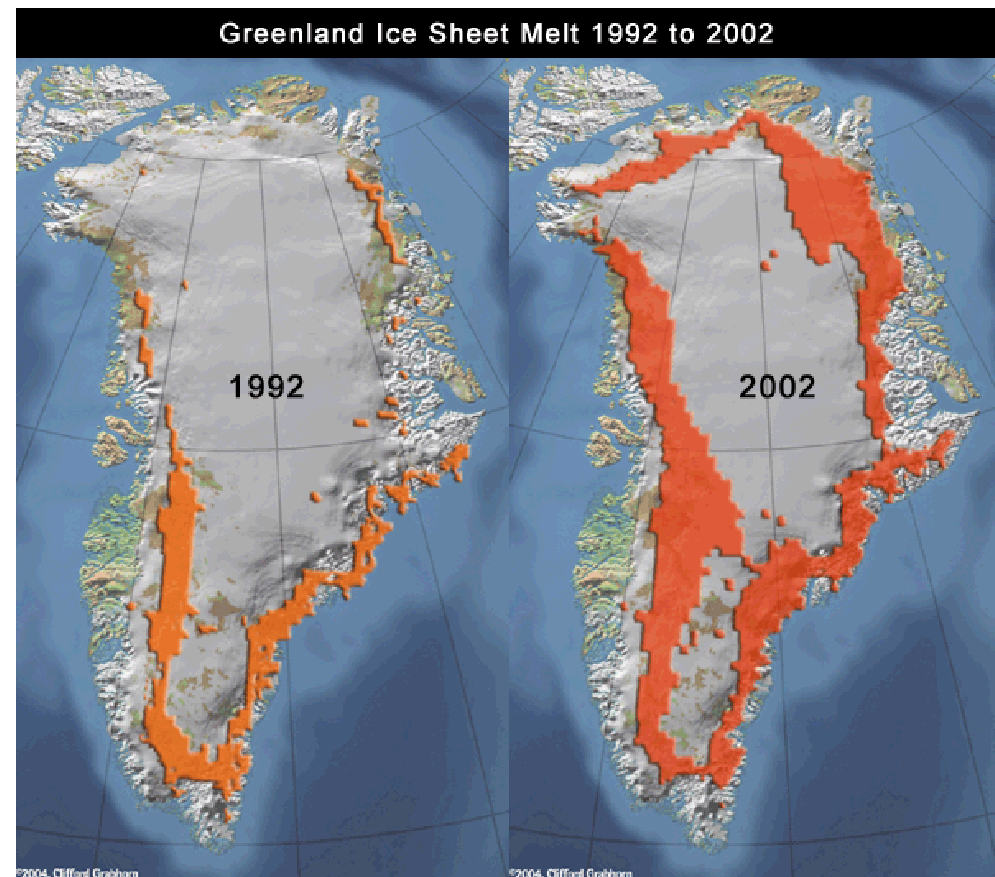
Hemen



# Aldatu, aldatzen ari da

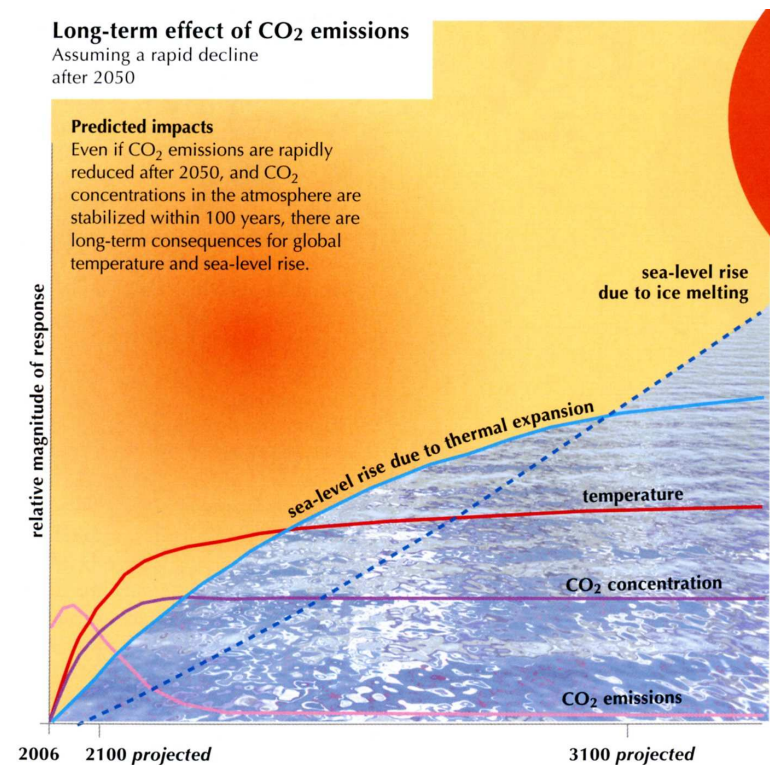
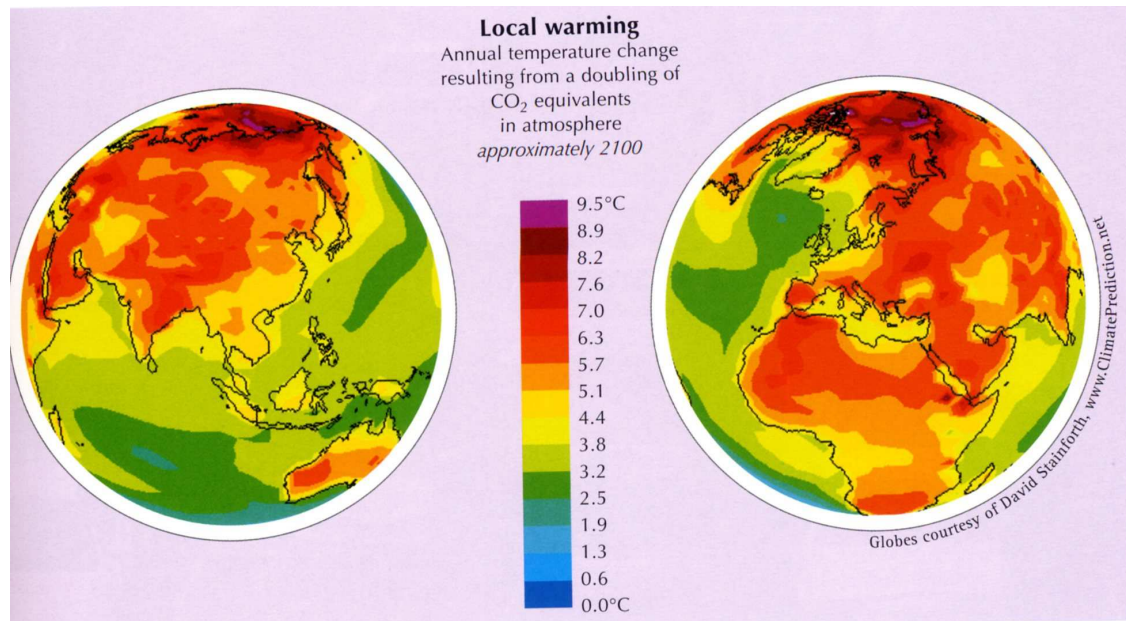
Klima uste baino gehiago ari da aldatzen  
Aldaketa azkarrenak latitude altuetan  
Faktore askoren arteko elkarrekintzak  
Atzera bueltarik ez dugu  
Mendeetan jarraituko du berotzen  
Baina kalteak murrizten saia gaitezke

- Klima aldaketa gutxitu
- Aldaketetarako prestatu



# Etorkizuneko klima

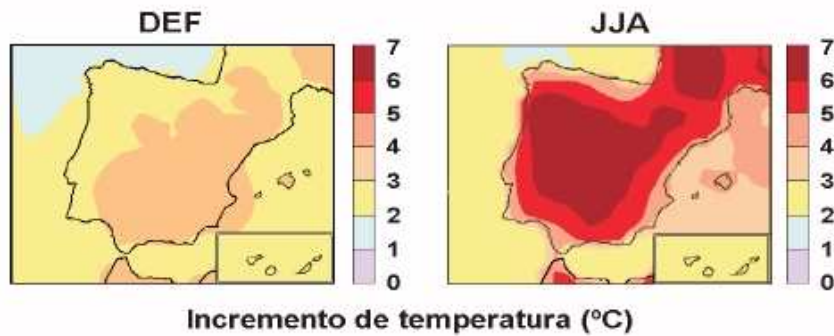
Kasurik onenean ere klima nabarmen aldatuko da  
 Gure gizartea berrantolatu beharko dugu  
 Eszenategi okerrenak beldurgarriak



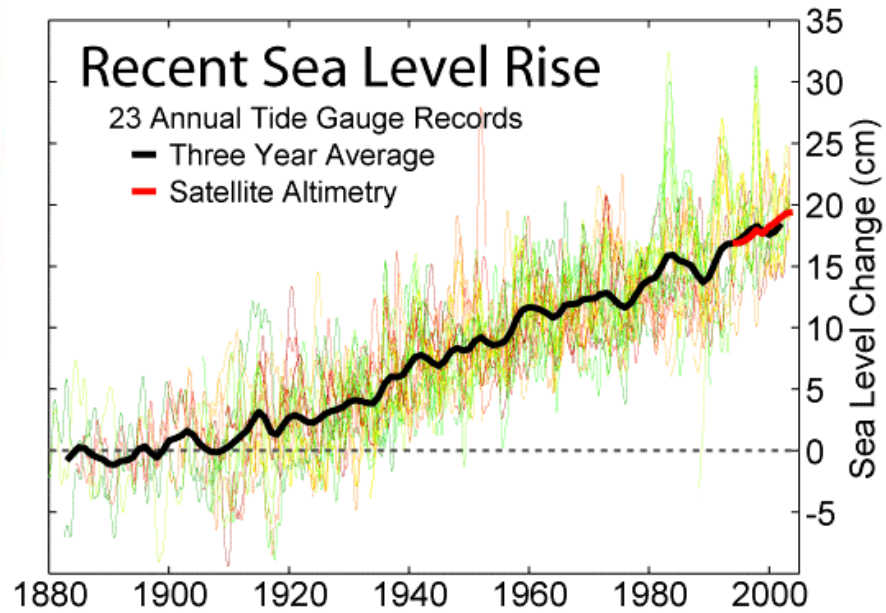


# Babesguneak eta klima-aldaketa

Proyecciones de cambio climático en 2071-2100  
SRES-A2



Orio



Zarautz

# Klima-aldaketaren ondorioak ekosistemetan

Ondorio oso konplexuak

- Tenperaturak goraka
- Aldakortasuna handitu
- CO<sub>2</sub> emendatu
- Prezipitazioak aldatu
- Komunitateak berrantolatu
- Paisaia zatitu
- Giza-presioa gora
- ....



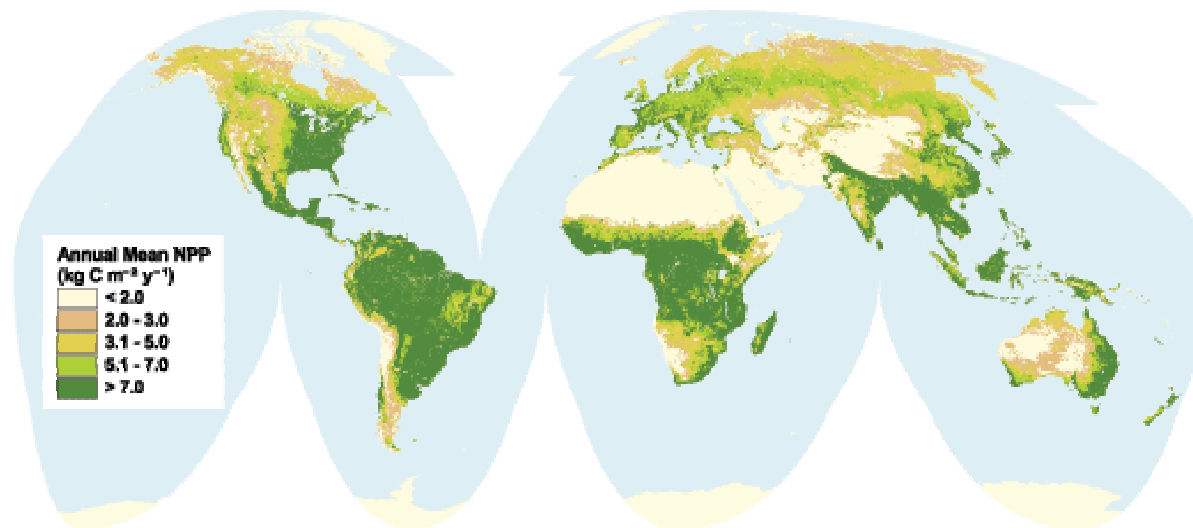
Vulnerability assessment of shrubland ecosystems in Europe under climatic changes.



# Etorkizuneko gizartea

Aldaketa nabarmenak nekazaritzan, uran, lurralde antolaketan, bizimoduan  
Moldatzeko diru asko beharko da  
Zer gertatuko da hirugarren munduan?  
Eta lehenean ziur al gaude?

**Map 7**  
Global Net Primary Productivity (1982 - 1993)



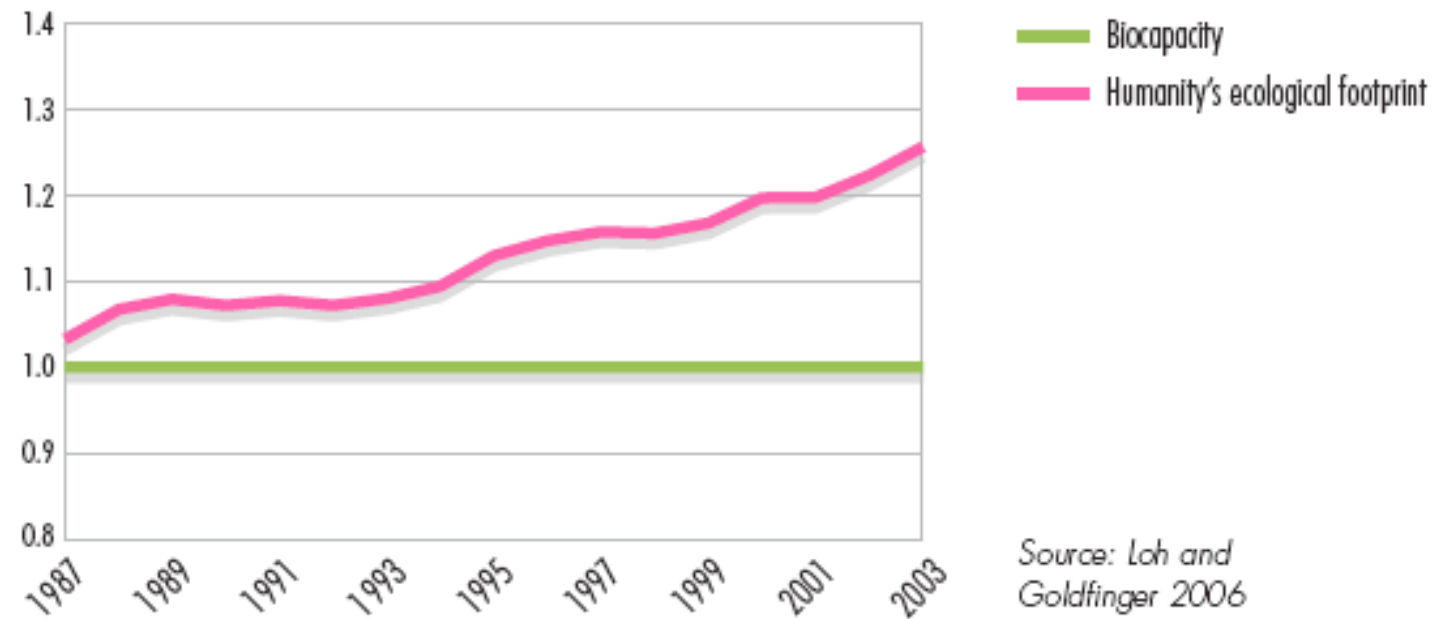
Source: GLCCD, 1998; Goetz et al., 1999; Prince and Goward, 1995.  
Projection: Interrupted Goode's Homolosine

# Joera jasanezina

Horrela ez dago jarraitzerik  
Giza-lorratza murriztu egin behar dugu

c) Humanity's ecological footprint

Number of Earths



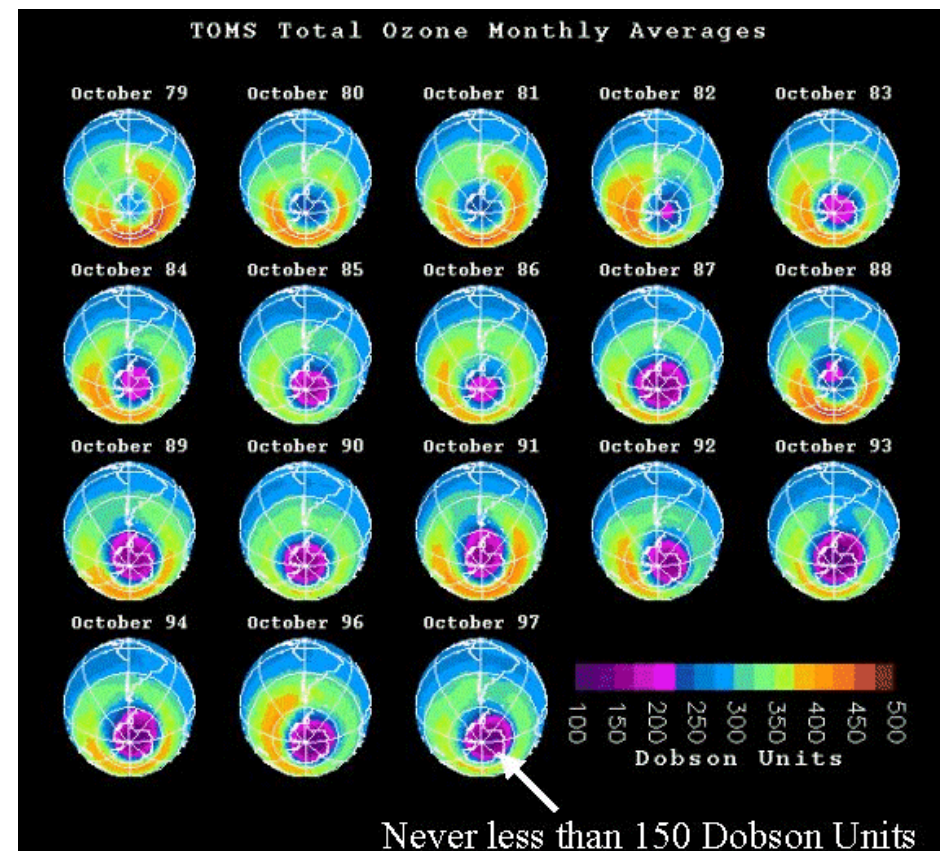


# Arazoak ala aukerak?

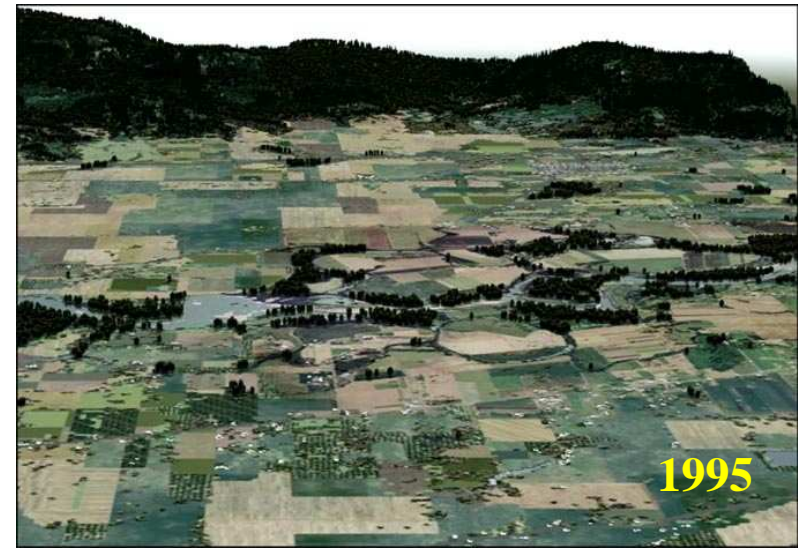
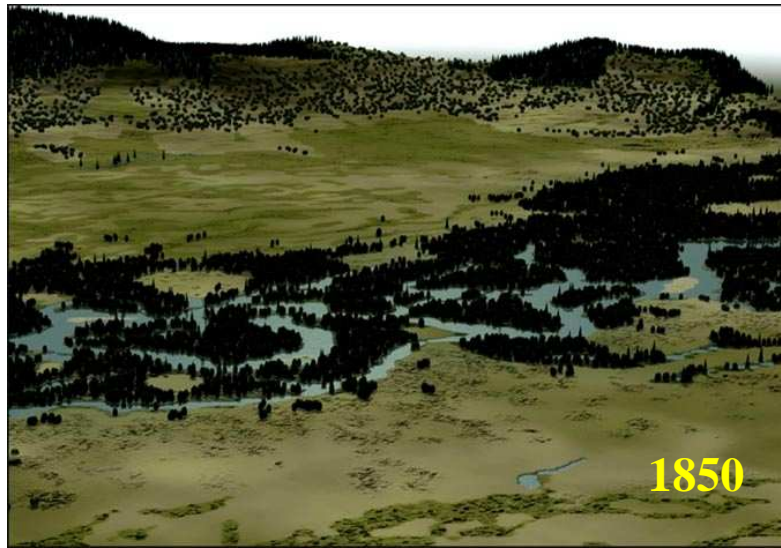
Erronka oso handia dugu aurrean  
Ekonomia eta gizartea kolokan

Erronkei AURRE egin behar zaie

Arazo batzuk hobetzeko aukera dira



## Dena ez dago galduta

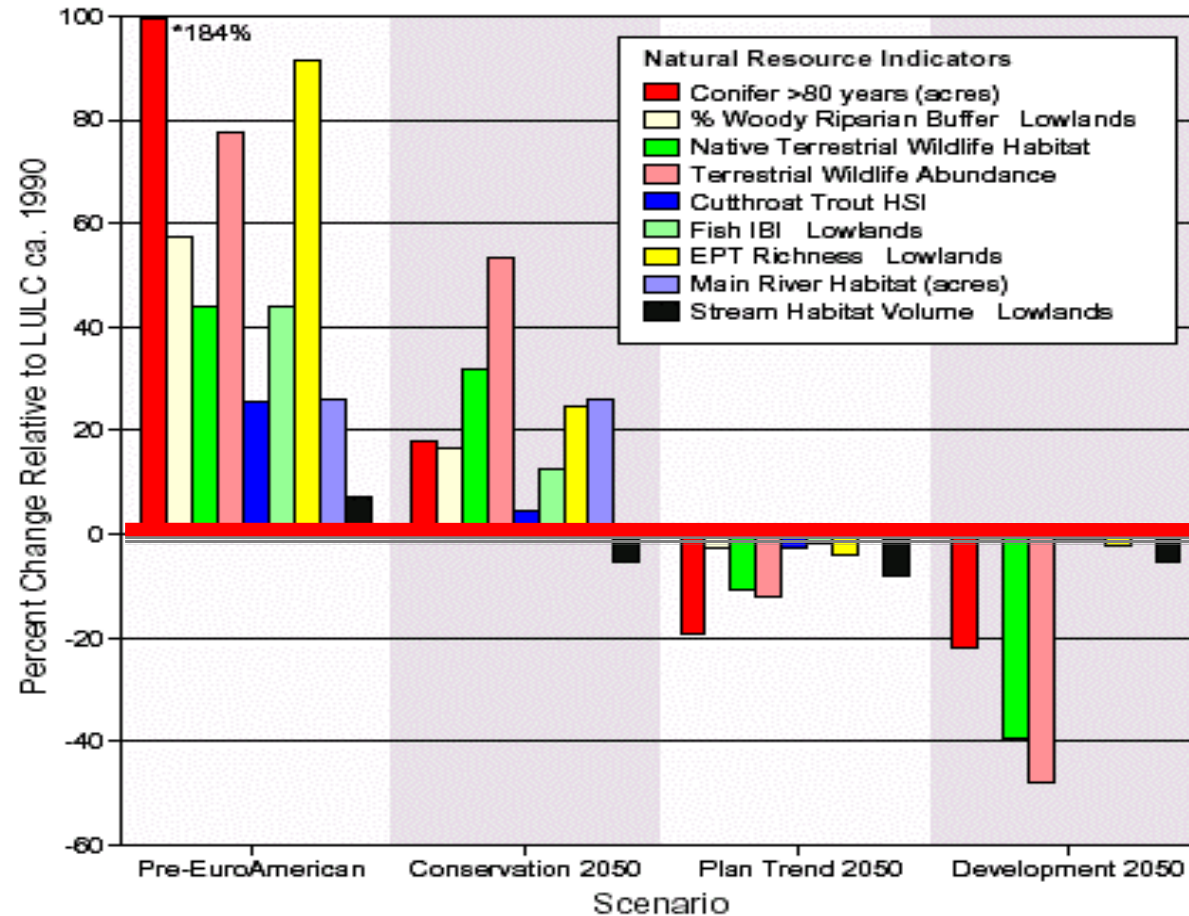


Baker et al. 2004. *Ecological Applications*

Villamette harana, Oregon, EEBB

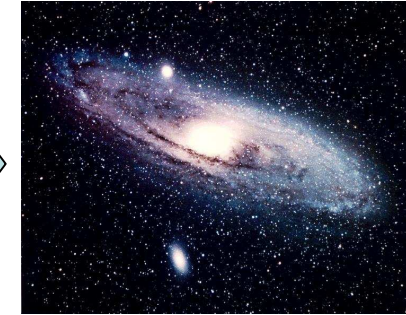
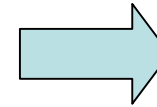
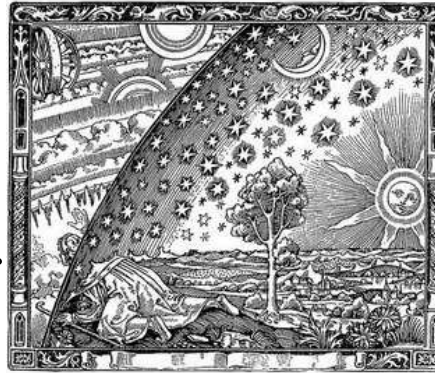


# Dena ez dago galduta

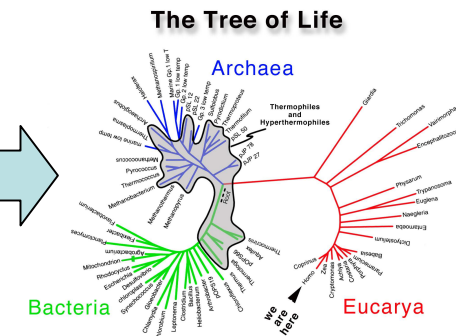
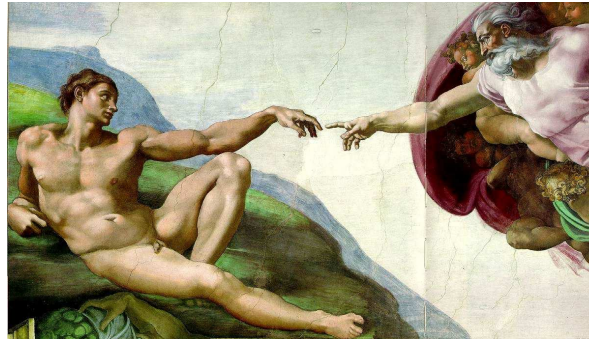


# Paradigma-aldaketa

✓ Galileo, Koperniko...



✓ Darwin...

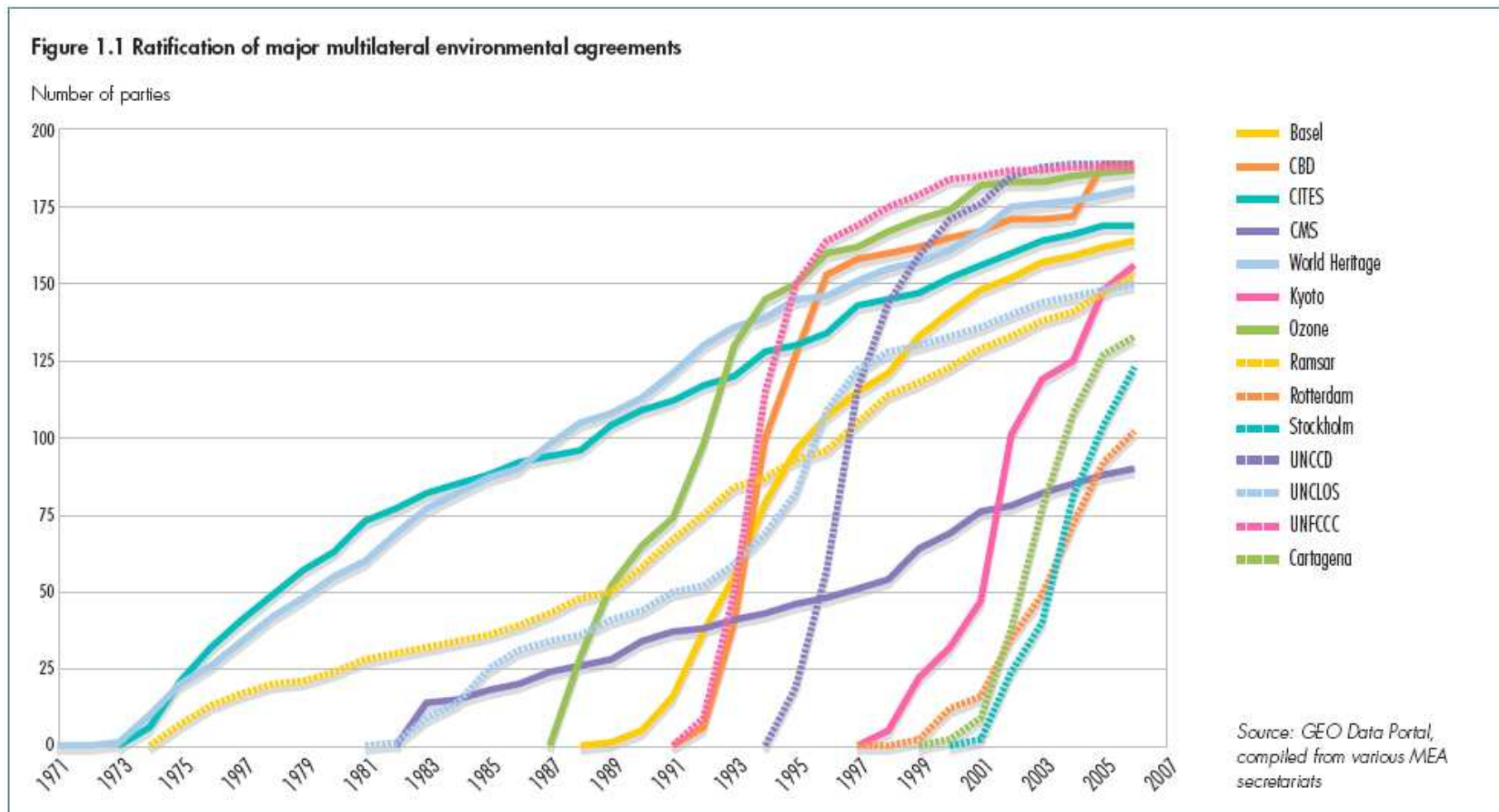


✓ Errealitatea





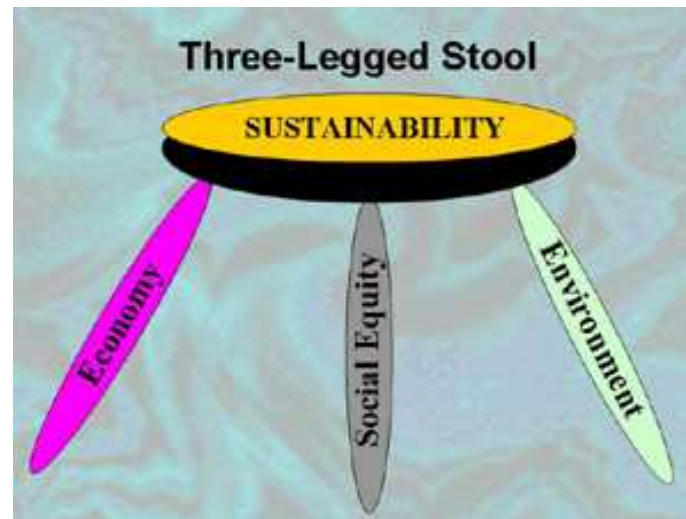
# Mundu berrirantz?



# Jasangarritasuna

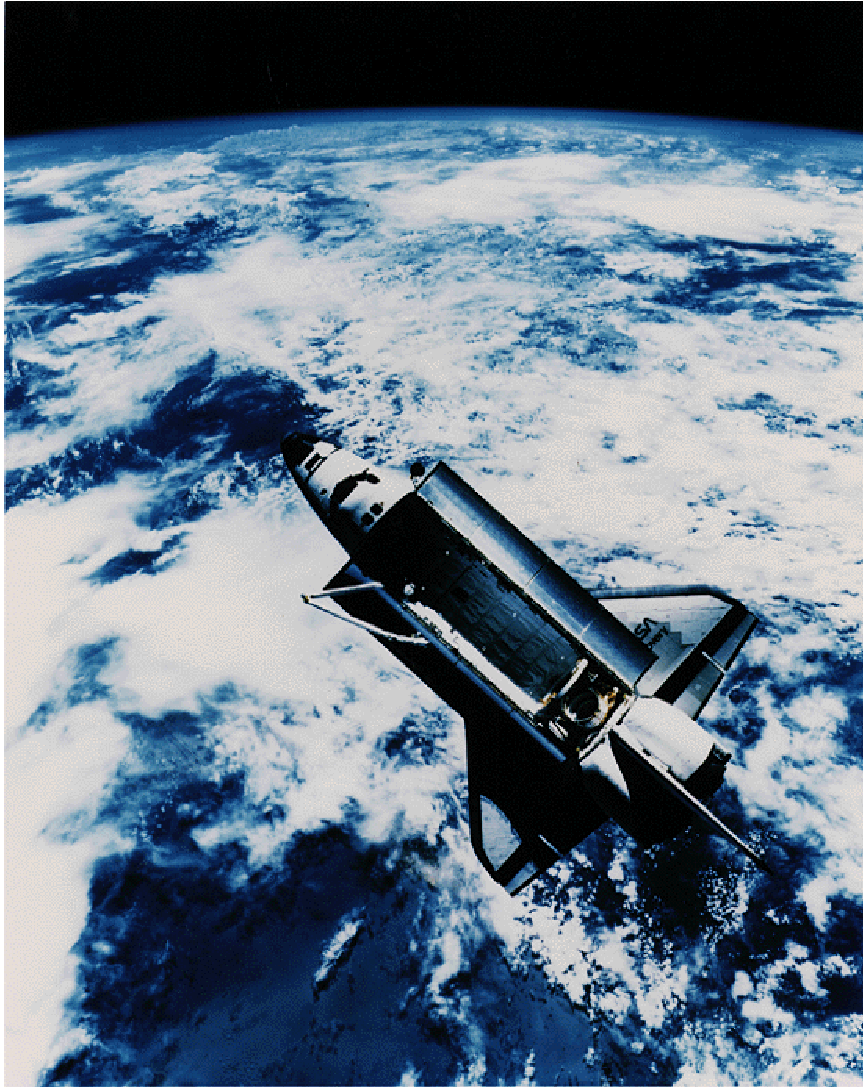
Jasangarritasunak hiru hanka omen:

- ✓ Soziala → Helburuak
- ✓ Ekonomikoa → Bideak
- ✓ Ekologikoa → *Sine quanon* baldintzak





## **Jasangarritasuna, guztion lana**



Irtenbidea ez da atzera egitea  
6.500.000.000 lagun ezin bizi  
modu “naturalean”

