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Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο

ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΠΡΟΓΡΑΜΜΑ
ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΔΙΑ ΒΙΟΥ ΜΑΘΗΣΗ
επένδυση στην κοινωνία της γνώσης

ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ ΚΑΙ ΘΡΗΣΚΕΥΜΑΤΩΝ
ΕΙΔΙΚΗ ΥΠΗΡΕΣΙΑ ΔΙΑΧΕΙΡΙΣΗΣ

Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

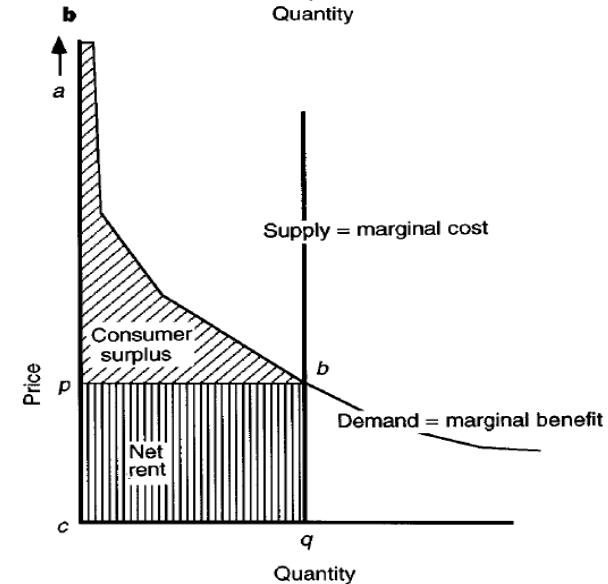
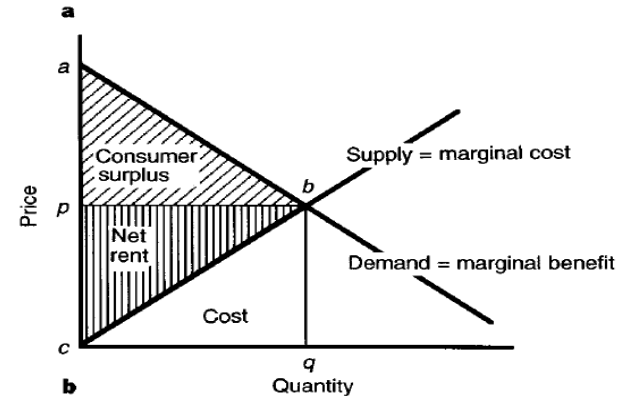


ΕΥΡΩΠΑΪΚΟ ΚΟΙΝΩΝΙΚΟ ΤΑΜΕΙΟ

ΠΕΓΑ: Βιοτικοί Πόροι- Τεχνικές Μελέτης και Αξιολόγησης Διάλεξη 5: ... Μεγέθη... και τάσεις...

Ανδρέας Τρούμπης
Καθηγητής Οικολογίας

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Η πράξη «Περιβαλλοντική Διαχείριση-Σύγχρονα Εργαλεία», του Επιχειρησιακού Προγράμματος «Εκπαίδευση και Δια Βίου Μάθηση», συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση (Ευρωπαϊκό Κοινωνικό Ταμείο-ΕΚΤ) και από Εθνικούς Πόρους.

Τα μεγέθη της αξίας των οικοσυστημάτων της Γης...

Table 1 Ecosystem services and functions used in this study

Number	Ecosystem service*	Ecosystem functions	Examples
1	Gas regulation	Regulation of atmospheric chemical composition.	CO ₂ /O ₂ balance, O ₃ for UVB protection, and SO _x levels.
2	Climate regulation	Regulation of global temperature, precipitation, and other biologically mediated climatic processes at global or local levels.	Greenhouse gas regulation, DMS production affecting cloud formation.
3	Disturbance regulation	Capacitance, damping and integrity of ecosystem response to environmental fluctuations.	Storm protection, flood control, drought recovery and other aspects of habitat response to environmental variability mainly controlled by vegetation structure.
4	Water regulation	Regulation of hydrological flows.	Provisioning of water for agricultural (such as irrigation) or industrial (such as milling) processes or transportation.
5	Water supply	Storage and retention of water.	Provisioning of water by watersheds, reservoirs and aquifers.
6	Erosion control and sediment retention	Retention of soil within an ecosystem.	Prevention of loss of soil by wind, runoff, or other removal processes, storage of silt in lakes and wetlands.
7	Soil formation	Soil formation processes.	Weathering of rock and the accumulation of organic material.
8	Nutrient cycling	Storage, internal cycling, processing and acquisition of nutrients.	Nitrogen fixation, N, P and other elemental or nutrient cycles.
9	Waste treatment	Recovery of mobile nutrients and removal or breakdown of excess or xenic nutrients and compounds.	Waste treatment, pollution control, detoxification.
10	Pollination	Movement of floral gametes.	Provisioning of pollinators for the reproduction of plant populations.
11	Biological control	Trophic-dynamic regulations of populations.	Keystone predator control of prey species, reduction of herbivory by top predators.
12	Refugia	Habitat for resident and transient populations.	Nurseries, habitat for migratory species, regional habitats for locally harvested species, or overwintering grounds.
13	Food production	That portion of gross primary production extractable as food.	Production of fish, game, crops, nuts, fruits by hunting, gathering, subsistence farming or fishing.
14	Raw materials	That portion of gross primary production extractable as raw materials.	The production of lumber, fuel or fodder.
15	Genetic resources	Sources of unique biological materials and products.	Medicine, products for materials science, genes for resistance to plant pathogens and crop pests, ornamental species (pets and horticultural varieties of plants).
16	Recreation	Providing opportunities for recreational activities.	Eco-tourism, sport fishing, and other outdoor recreational activities.
17	Cultural	Providing opportunities for non-commercial uses.	Aesthetic, artistic, educational, spiritual, and/or scientific values of ecosystems.

Τα μεγέθη της αξίας των οικοσυστημάτων της Γης...

Table 1. Surface area by type of cover and total net primary production (from Ajtay et al. 1979 and De Vooy 1979).

Type	Surface area ($\times 10^6 \text{ km}^2$)	Net primary production (Pg)
Forest	31	48.7
Woodland, grassland, and savanna	37	52.1
Deserts	30	3.1
Arctic-alpine	25	2.1
Cultivated land	16	15.0
Human area	2	0.4
Other terrestrial (chaparral, bogs, swamps, and marshes)	6	10.7
Subtotal terrestrial	147	132.1
Lakes and streams	2	0.8
Marine	361	91.6
Subtotal aquatic	363	92.4
Total	510	224.5

Τα μεγέθη της αξίας των οικοσυστημάτων της Γης...

Table 2. Amount of net primary production (NPP) used directly by humans and domestic animals.

Source	NPP used (Pg)
Cultivated land, food	0.8
Domestic animal fodder	2.2
Wood products	
Construction and fiber	1.2
Firewood	1.0
Fisheries (0.020 dry wt harvested)	2.0
Total	7.2
Percent NPP (7.2/224.5)	3.2

Τα μεγέθη της αξίας των οικοσυστημάτων της Γης...

Table 3. Intermediate calculation of net primary productivity (NPP) co-opted by humans.

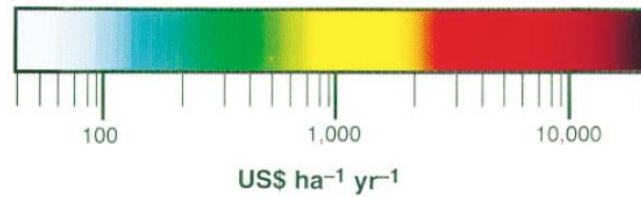
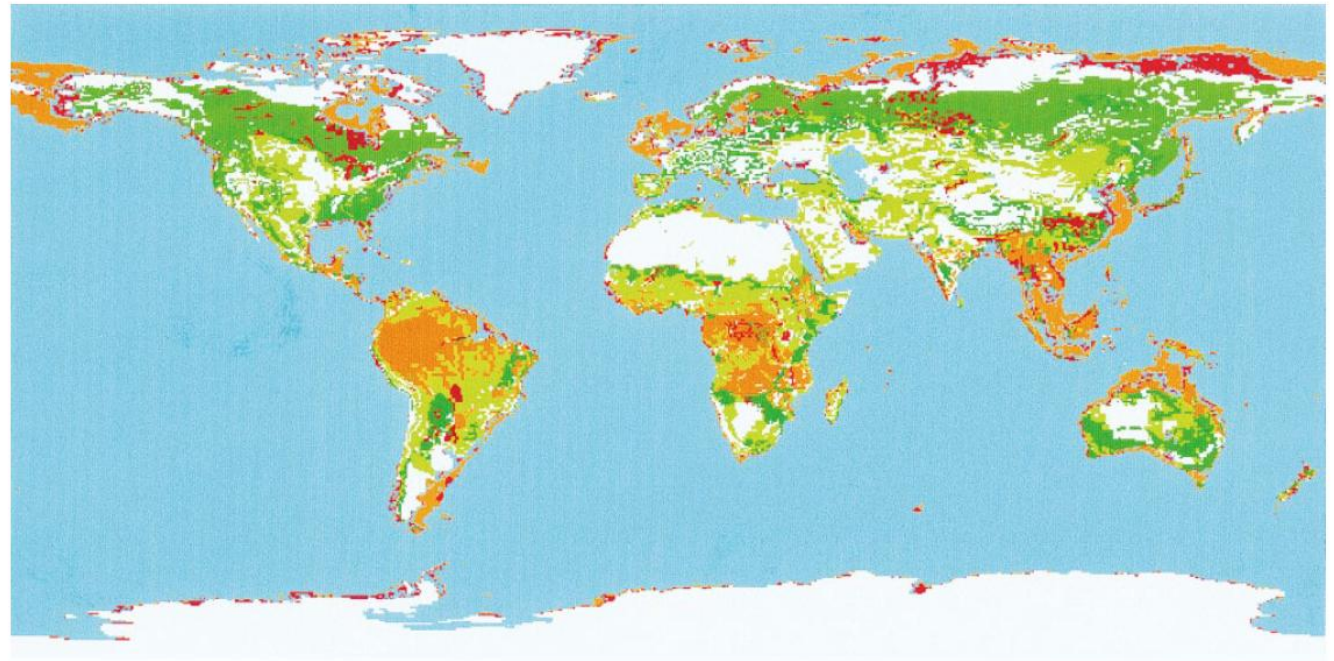
Source	NPP co-opted (Pg)
Cultivated land	15.0
Grazing land	
Converted pastures	9.8
Consumed on natural grazing lands	0.8
Burned on natural grazing land	1.0
Subtotal	11.6
Forest land	
Killed during harvest, not used	1.3
Shifting cultivation	6.1
Land clearing	2.4
Forest plantation productivity	1.6
Forest harvests	2.2
Subtotal	13.6
Human occupied areas	0.4
Subtotal terrestrial	40.6
Aquatic ecosystems	2.0
Total	42.6
Percent terrestrial co-opted (40.6/132.1)	30.7
Percent aquatic co-opted (2.0/92.4)	2.2

Table 4. High calculation of net primary productivity (NPP) co-opted by humans: additions to Table 3 from processes that co-opt or degrade NPP.

Process	Amount (Pg)
Previous terrestrial total (Table 3)	40.6
Decreased NPP in agriculture	9.0
Conversion of forest to pasture	1.4
Desertification	4.5
Loss to human areas	2.6
Total terrestrial	58.1
Percent terrestrial co-opted or lost (58.1/149.8)	38.8
Percent terrestrial plus aquatic co-opted or lost [60.1/(149.8 + 92.4)]	24.8

Τα μεγέθη της αξίας των οικοσυστημάτων της Γης...

Figure 2 Global map of the value of ecosystem services. See Supplementary Information and Table 2 for details.



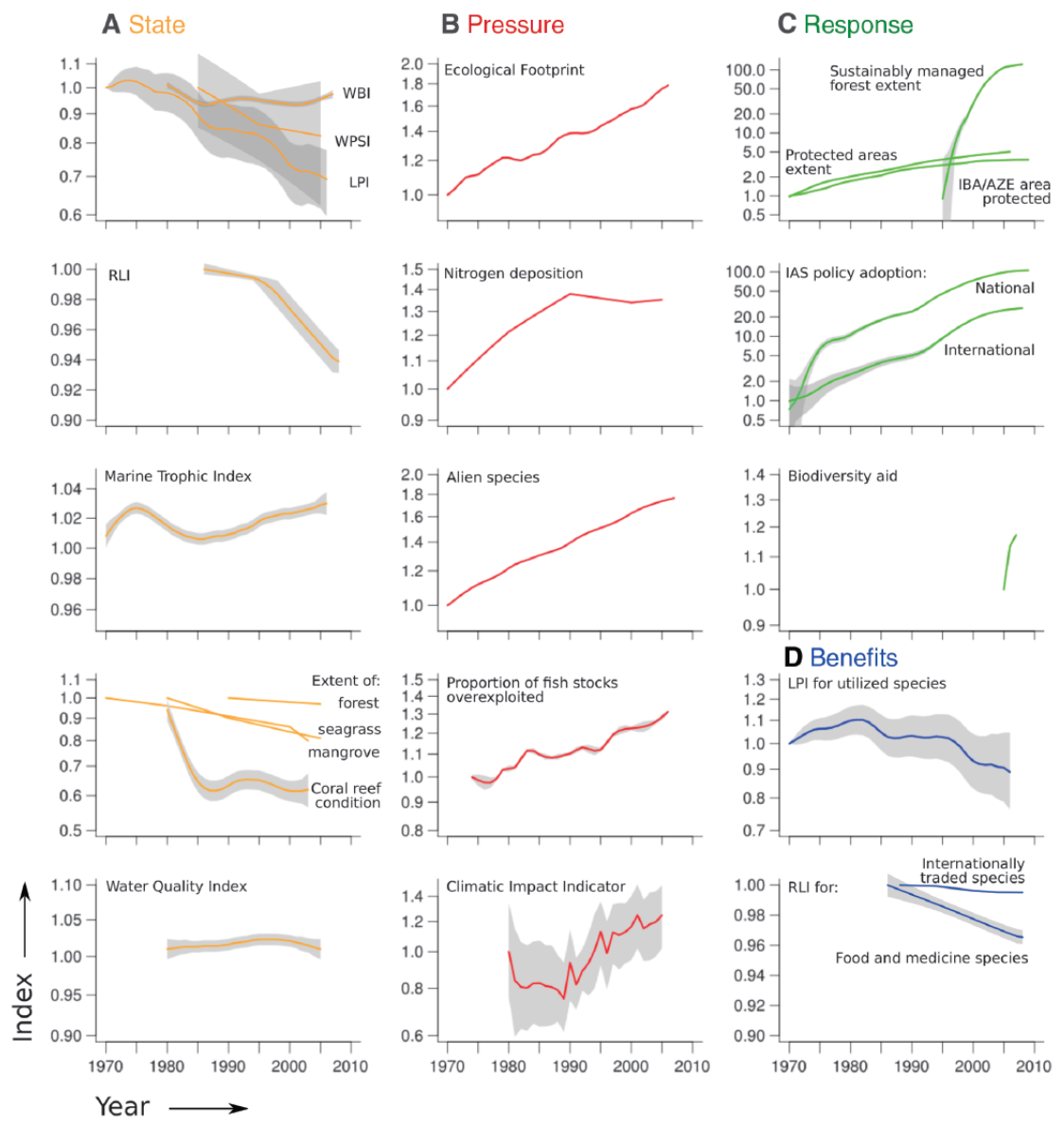
Από τη Θεωρία στην πραγματικότητα: η οικονομική αξία...

Table 3

Changes in area, unit values and aggregate global flow values from 1997 to 2011 (green are values that have increased, red are values that have decreased).

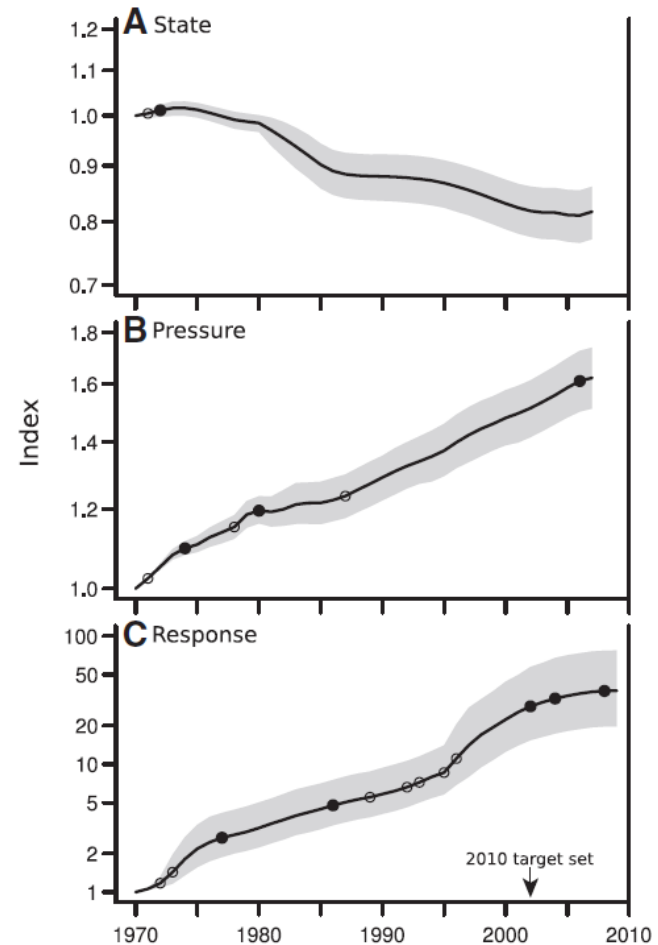
Biome	A. Original			B. Change unit values only			C. Change area only			D. Change both unit values and area		E. Column C - Column A		F. Column D - Column B	
	Area (e6 ha)		Change	Unit values 2007\$/ha/yr		Change	Aggregate Global Flow Value e12 2007\$/yr		2011	2011	1997 unit values	2011 unit values	2011-1997 Change in Value e12 2007\$/yr		
	1997	2011	2011-1997	1997	2011	2011-1997	1997	2011	2011	2011					
Marine	36,302	36,302	0	796	1,368	572	28.9	60.5	29.5	49.7	0.6	(10.9)			
Open Ocean	33,200	33,200	0	348	660	312	11.6	21.9	11.6	21.9	-	-			
Coastal	3,102	3,102	0	5,592	8,944	3,352	17.3	38.6	18.0	27.7	0.6	(10.9)			
Estuaries	180	180	0	31,509	28,916	-2,593	5.7	5.2	5.7	5.2	-	-			
Seagrass/Algae Beds	200	234	34	26,226	28,916	2,690	5.2	5.8	6.1	6.8	0.9	1.0			
Coral Reefs	62	28	-34	8,384	352,249	343,865	0.5	21.7	0.2	9.9	(0.3)	(11.9)			
Shelf	2,660	2,660	0	2,222	2,222	0	5.9	5.9	5.9	5.9	-	-			
Terrestrial	15,323	15,323	0	1,109	4,901	3,792	17.0	84.5	12.1	75.1	(4.9)	(9.4)			
Forest	4,855	4,261	-594	1,338	3,800	2,462	6.5	19.5	4.7	16.2	(1.8)	(3.3)			
Tropical	1,900	1,258	-642	2,769	5,382	2,613	5.3	10.2	3.5	6.8	(1.8)	(3.5)			
Temperate/Boreal	2,955	3,003	48	417	3,137	2,720	1.2	9.3	1.3	9.4	0.0	0.2			
Grass/Rangelands	3,898	4,418	520	321	4,166	3,845	1.2	16.2	1.4	18.4	0.2	2.2			
Wetlands	330	188	-142	20,404	140,174	119,770	6.7	36.2	3.4	26.4	(3.3)	(9.9)			
Tidal Marsh/Mangroves	165	128	-37	13,786	193,843	180,057	2.3	32.0	1.8	24.8	(0.5)	(7.2)			
Swamps/Floodplains	165	60	-105	27,021	25,681	-1,340	4.5	4.2	1.6	1.5	(2.8)	(2.7)			
Lakes/Rivers	200	200	0	11,727	12,512	785	2.3	2.5	2.3	2.5	-	-			
Desert	1,925	2,159	234	-	-	0	-	-	-	-	-	-			
Tundra	743	433	-310	-	-	0	-	-	-	-	-	-			
Ice/Rock	1,640	1,640	0	-	-	0	-	-	-	-	-	-			
Cropland	1,400	1,672	272	126	5,567	5,441	0.2	7.8	0.2	9.3	0.0	1.5			
Urban	332	352	20	-	6,661	6,661	-	2.2	-	2.3	-	0.1			
Total	51,625	51,625	0				45.9	145.0	41.6	124.8	(4.3)	(20.2)			

Η συντριπτική αποτυχία της πολιτικής διατήρησης της βιοποικιλότητας: 40 έτη μύθων...



Η συντριπτική αποτυχία της πολιτικής διατήρησης της βιοποικιλότητας: 40 έτη μύθων...

Fig. 2. Aggregated indices of **(A)** the state of biodiversity based on nine indicators of species' population trends, habitat extent and condition, and community composition; **(B)** pressures on biodiversity based on five indicators of ecological footprint, nitrogen deposition, numbers of alien species, overexploitation, and climatic impacts; and **(C)** responses for biodiversity based on six indicators of protected area extent and biodiversity coverage, policy responses to invasive alien species, sustainable forest management, and biodiversity-related aid. Values in 1970 set to 1. Shading shows 95% confidence intervals derived from 1000 bootstraps. Significant positive/upward (open circles) and negative/downward (filled circles) inflections are indicated.



SMART 2020 Biodiversity targets

STRATEGIC GOALS	TARGETS: BY 2020...
<p>Address underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.</p>	<ol style="list-style-type: none"> 1. All people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably. 2. The values of biodiversity are integrated into [national accounts], national and local development, and poverty reduction strategies.... 3. Incentives [including subsidies] harmful to biodiversity are eliminated, phased out, or reformed in order to minimize negative impacts.... 4. Governments, business, and stakeholders ... have taken steps to achieve or have implemented plans for sustainable production ...
<p>Reduce direct pressures on biodiversity and promote sustainable use.</p>	<ol style="list-style-type: none"> 5. The rate of loss and degradation, and fragmentation, of natural habitats [including forests] is [at least halved] [brought close to zero]. 6. [Overfishing is ended, destructive fishing practices are eliminated, and all fisheries are managed sustainably.].... 7. Areas under agriculture, aquaculture, and forestry are managed sustainably, ensuring conservation of biodiversity. 8. Pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity. 9. Invasive alien species are identified, prioritized, and controlled or eradicated, and measures are in place to control pathways.... 10. To have minimized the multiple pressures on coral reefs and other vulnerable ecosystems affected by climate change....
<p>Improve status of biodiversity by safeguarding ecosystems, species, and genetic diversity.</p>	<ol style="list-style-type: none"> 11. At least [15%][20%] of terrestrial, inland-water, and [X%] of coastal and marine areas are conserved.... 12. The extinction and decline of known threatened species has been prevented.... 13. The loss of genetic diversity of cultivated plants and domestic farm animals in agricultural ecosystems and of wild relatives is halted....
<p>Enhance benefits to all from biodiversity and ecosystem services.</p>	<ol style="list-style-type: none"> 14. Ecosystems that provide essential services and contribute to health, livelihoods, and well-being, are safeguarded.... 15. Ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration....
<p>Enhance implementation through participatory planning, knowledge management, and capacity building.</p>	<ol style="list-style-type: none"> 16. Access to genetic resources is [promoted] [facilitated] [enhanced], and benefits are shared.... 17. Each party has developed, adopted, ... and implemented, an effective, participatory, and updated national biodiversity strategy and action plan. 18. [[Have [sui generis legal] systems in place to protect] traditional knowledge, innovations, and practices relevant to biodiversity ...].... 19. Knowledge, the science base and technologies relating to biodiversity, its values, functioning, status, and trends, are improved. 20. Capacity (human resources and financing) for implementing the convention has increased [10-fold].

SMART 2020 Biodiversity targets: κριτική...

1) *Functional diversity*. Ecosystem services derive from ecosystem functions and the species that perform those functions. In some cases, individual species play a disproportionately large role in the provision of services, but in most cases, targets should focus on conserving critical functional diversity. What matters for most ecosystem services is the diversity of traits species possess (e.g., nitrogen fixers, pollinators, and nutrient recyclers) (7–10). However, only target 13, on crop and livestock genetic diversity, references functional diversity.

3) *Interactions between targets*. Target 3 explicitly recognizes harmful environmental effects of agricultural subsidies. But potential interactions between most other targets are ignored. Targets 7 and 13 would be expected to have well-understood effects on the supply of ancillary ecosystem services and on species not directly exploited in the production of crops or livestock (13–15). Also, target 6 addresses threats to fish production. Its implementation would affect and be affected by implementation of targets for other ecosystem services, including regulation of climate (16, 17).

2) *Environmental uncertainty and target adjustment*. How much diversity it is critical to maintain depends on the range of environmental conditions expected. The greater the expected variation in environmental conditions, the greater the required diversity within groups providing particular functions. Ecological functioning may change as environmental conditions change (11, 12). Targets for diversity within functional groups of species should adjust with changes in expectations about the state of the environment.

4) *Trade-offs between targets*. Different services require different diversity. How much diversity is critical depends on the set of services we need. But species that support a service such as climate regulation are different from species that support a service such as food production (18, 19), and there may be trade-offs between them. That is the core message of the MA (5). Targets need to be set in recognition of these trade-offs. It may not be possible to meet all of the 2020 targets.

Θεσμοί προστασίας φύσης...

Table 1. Protected area management categories (IUCN 1994)

Category	Name	Description	Example
I	Strict nature reserve wilderness area	Protected area managed mainly for science or wilderness protection	Polar Bear Pass, Canada; Sundarbans, or India
I	National park	Protected area managed mainly for ecosystem protection and recreation	Yellowstone, USA; Sagarmatha, Nepal
I	National monument	Protected area managed mainly for conservation of specific natural features	Devil's Tower, USA; Victoria Falls, Zimbabwe
IV	Habitat or species management area	Protected area managed mainly for conservation through management intervention	San Francisco Bay, USA; Selous, Tanzania
V	Protected landscape or seascape	Protected area managed mainly for landscape or seascape conservation and recreation	Dartmoor, UK; Taishan, China
VI	Managed resource protected area	Protected area managed mainly for the sustainable use of natural ecosystems	Ocala National Forest, USA; Rub'al-Khali, Saudi Arabia

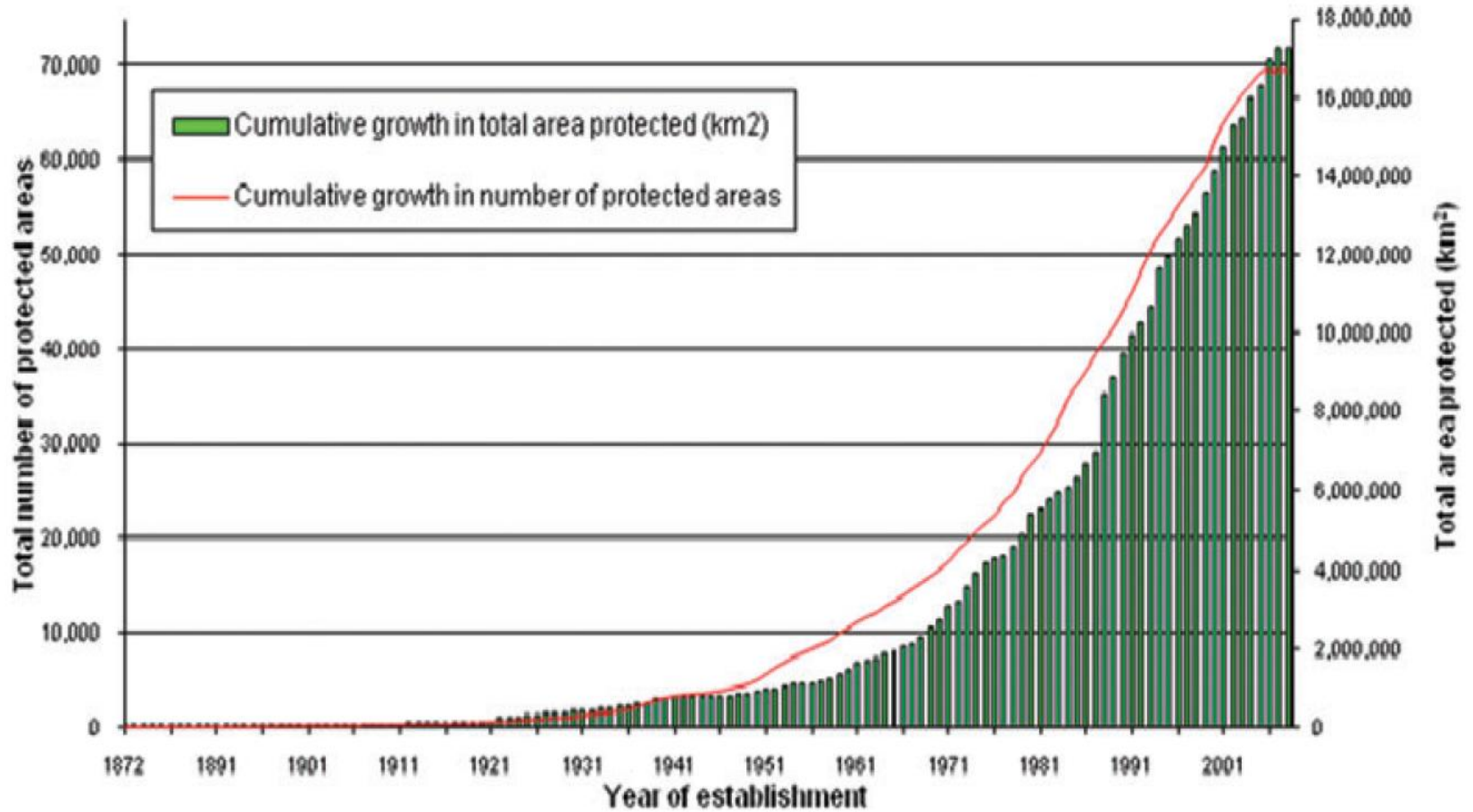
Κόστη (ετήσια) για τις προστατευόμενες περιοχές...

Table 2. Annual cost of a globally representative protected area system

	Protected area (1996 dollars)	Current spending (1996 dollars)	Estimated shortfall (sq. km)	Survey cost (1996 dollars)	Scenario 1 Added area (1996 dollars)	Scenario 1 Cost (1996 dollars)	Scenario 2 Added area (sq. km)	Scenario 2 Cost (1996 dollars)	Scenario 1 Management (sq. km)	Scenario 2 Management (1996 dollars)	Compensation payment (1996 dollars)
Developed Regions											
North America	3.92	3,350	335	76	0.00	0	0.03	104	0	33	0
		854	85								
Europe	0.60	1,171	505	53	0.00	0	0.34	3,001	0	943	0
		1,941	837								
Australia/New Zealand	1.11	297	30	9	0.03	29	0.23	218	9	68	0
		268	27								
East Asia (developed)	0.04	453	45	26	0.01	595	0.03	1,445	187	454	0
		12,308	1,231								
Developing Regions											
Latin America	2.12	216	297	17	0.03	31	1.17	772	10	242	1,243
		102	140								
Russia and CIS	0.66	51	57	14	1.55	808	1.79	930	254	292	268
		78	86								
North Africa/Middle East	1.04	43	195	11	0.25	182	1.15	839	57	263	231
		41	188								
Africa	2.07	245	253	26	0.63	721	1.57	1,392	227	437	1,896
		118	122								
Asia (developing)	1.58	105	567	32	0.51	648	1.07	1,407	204	442	1,283
		67	359								
Pacific	0.01	35	7	7	0.04	430	0.05	549	135	172	25
		2,673	500								
Developing regions total	7.48	695	1,375	106	3.01	2,820	6.80	5,888	886	1,850	4,947
		93	184								
Developed regions total	5.67	5,271	915	164	0.04	623	0.64	4,768	196	1,498	0
		929	161								
World total	13.16	5,967	2,290	270	3.06	3,443	7.44	10,656	1,082	3,347	4,947
		453	174								

Notes: All figures are in millions, except those in italics, which indicate per-square-kilometer costs in dollars; all costs are annual (survey and purchase annual payment calculated at 5% interest over 30 years).

Εκτάσεις προστατευόμενων περιοχών...



Το φαινόμενο PADDD...

Table 2 Contemporary accounts of PADDD documented in news articles published August 31, 2009–April 30, 2010.

Country	Protected area	PADDD event	year	Cause (as described in text)	Source
Belize	Bladen Nature Reserve	Proposed downgrade	2010	"...environmental groups and the San Pedro Columbia community are mounting opposition to the proposed construction of a dam. The site is the Central River that runs through the Columbia River Forest Reserve and the Bladen Nature Reserve, two core conservation areas."	Great Belize Productions (2010)
Canada	Scaterie Island Wilderness Area	Proposed downgrade	2009	"Humane Society International Canada is speaking out about a move in Nova Scotia to allow a commercial seal hunt off Hay Island, a part of the province's Scaterie Island Wilderness Area."	Canwest News Service (2009)
India	Himachal Pradesh wildlife protected areas	Proposed downsize	2009	"Himachal Pradesh will redraw the boundaries of its wildlife protected areas to allow development activities. ..."	IANS (2009)
India	Pench National Park	Proposed downgrade	2010	"... the National Highway Authority of India (NHAI) as part of their plan to connect Srinagar and Kanyakumari wants to build a 56 km stretch in Madhya Pradesh which is proposed to cut through Pench National Park. ..."	Dutt (2010)
India	Karera Sanctuary	Proposed degazette-ment	2010	"The National Board of Wildlife (NBWL) chaired by Environment Minister Jairam Ramesh in a recent meeting approved the state government's proposal to denotify the sanctuary, after its officials said that the bustards were not sighted since 1995 and that most of the land inside the sanctuary sprawling over 202 km ² was private land and people were facing lot of problems."	Press Trust of India (2010)
Indonesia	"Protected and conservation forest areas"	Proposed downgrade	2010	"President Susilo Bambang Yudhoyono finally signed a regulation legalizing the conversion of protected and conservation forest areas for business purposes."	Simamora (2010a)
New Zealand	Mount Aspiring National Park	Proposed downsize	2009	"A leaked report recommends the Government remove up to 20% of Mount Aspiring National Park from a schedule of protected areas, opening the way for mining and exploration in the designated World Heritage area."	Haggart (2009)
New Zealand	42 protected areas	Proposed downgrade	2009	"The party obtained information showing there were 21 current mineral permits for prospecting and exploration in 42 areas protected from mining by Schedule Four of the Crown Minerals Act".	NZPA (2009b)
New Zealand	"7000 ha of conservation land"	Proposed downgrade	2010	"The Government plans to remove about 7000 hectares of conservation land from schedule 4 of the Crown Minerals Act, which protects it from mining."	Weir (2010)
Philippines	Hundred Islands National Park	Proposed downsize	2009	"The group, which exposed an attempt to "chop-chop" the HINP, expressed alarm that the passage of the proposed measure may be used to develop the island for residential, commercial and industrial purposes."	Benaning (2009)
Philippines	Bulacan Biosphere Reserve	Downgrade	2010	"... road construction, as well as mining exploration and extractive activities on Mt. Bulanjao, have taken place in areas that, according to the ECAN (Ecological Critical Areas Network), fall into the so called 'Core Zones' of maximum protection. ..."	Lazaro (2010)
Puerto Rico	Northeast Ecological Corridor	Proposed downsize	2009	"Puerto Rico's governor on Friday canceled the designation of part of the island's northeastern coastline as a nature reserve, opening the door to large-scale development along a white-sand beach where proposals for hotel resorts have sparked bitter protests."	Associated Press (2009)
Romania	"Two national parks"	Proposed downgrade	2010	"...criticized the construction of a national road to cross two national parks. ..."	AFP (2010)
United States	Big Cypress National Preserve	Proposed downgrade	2009	"...a cash-strapped Miami-Dade County has been mulling the possibility of drilling for oil beneath the [Big Cypress National Preserve]. ... to help pay for the expansion of Miami-Dade International Airport."	Repanshek (2009)

ΕΚCs και κρατούσα θεωρία περί διατήρησης της βιοποικιλότητας

