



GREEN INFRASTRUCTURE IMPLEMENTATION AND EFFICIENCY

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Annex III: Costs of Green Infrastructure

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1 OVERVIEW OF COSTS OF GREEN INFRASTRUCTURE INITIATIVES

Overall, about 100 initiatives identified in the country files, about half returned at least some information on costs or expenditures. The initiatives were split into general themes to categorise their priorities. Within themes, the difference in scale of the initiatives can be huge (see Table 1.1). This is partly due to the fact that some of those examples included are probably better described as projects, given their local nature.

In some cases, differences reflect disparities in financial means, emphasis and approach to green infrastructure implementation between Member States. In the case of the very expensive initiatives, this tended to include costs that would not strictly be considered related to green infrastructure. Table 1.1 below presents the costs of the initiatives identified for this study, ordered by theme. Note: these do not by any means represent a total cost of initiatives in the EU; it merely provides an overview of the dataset from which much of the conclusions below are derived.

Table 1.1 An overview of the costs of the initiatives identified for this study

Theme	No.	Total costs (€)	Average Cost (€)	Maximum (€)	Minimum (€)
Climate change adaptation / mitigation	2	1,720,000	860,000	1,600,000	120,000
Ecological network for biodiversity connectivity & coherence	9	14,478,283,672	1,608,698,186	13,288,000,000	500,000
Freshwaters & Wetlands management & restoration*	14	8,057,687,649	575,549,118	4,404,000,000	128,500
GI mapping for integration in planning	4	62,866,844	15,716,711	58,000,000	400,000
Grey infrastructure mitigation	4	624,185,000	156,046,250	410,000,000	5,000,000
Multi-functional use/ enhancement in the wider environment/permeability: Coastal zones (ICZM)	4	237,924,766	59,481,192	200,989,530	1,664,086
Multi-functional: farmland & forestry	4	462,004,804	115,501,201	275,000,000	50,000
Other	1	100,000,000	100,000,000	100,000,000	100,000,000
Urban green infrastructure	4	158,132,174	39,533,044	106,009,760	750,000
Multi-functional use: general	3	1,557,800,000	519,266,667	910,800,000**	90,000,000

* Includes three initiatives from the Danube, and therefore possible double counting

** Represents an annual budget.

2 COSTS OF GREEN INFRASTRUCTURE INTERVENTIONS

Green infrastructure actions vary significantly in cost depending on the green infrastructure element, habitat, site conditions amongst others. Below are selected costs from the literature on restoration costs and sustainable use zones (Tables 2.1 and 2.2). Table 2.3, taken from Hart et al (2011) summarises the estimated total costs of practices to address soil erosion and organic matter content issues at the EU level.

Table 2.1: Examples of ecosystem / habitat conservation and restoration actions and their costs

Ecosystem / location	Restoration project/example	Overall cost	Restoration actions	Cost per ha (units vary)	Ecosystem service benefits	Source
Fallow dry grasslands / Germany	Restoration of open fallow grasslands in Saxony valley	-	Manual shrub removal	Up to €8,500	Biodiversity conservation, livelihood opportunities	(Tischew et al, 2008)
Wetland grasslands / UK		-	Sowing of specially formulated seed mixes	£156 - £1,132 (1993 prices for range of seed mixes)	Reduced leaching to watercourses, stabilisation of soils and river banks, habitat provision	(Manchester et al, 1999)
Open habitats / UK	Restoration of a range of open habitats (from meadows to fens/bogs etc) by various methods			£622 - £1,164 average across habitats		(Driver, 2008)
Wetland / Denmark	€67 million		Wetland restoration through hydrological manipulation	€8,375	Reduction of nitrogen loads to down-stream recipients	(Hoffmann and Baattrup-Pedersen, 2007)
River ecosystem / Denmark	Restoration of the Skjern River		Construction and restoration of watercourses	€130,000	Reconnect rivers for migratory fish, develop tourist potential	(TEEB, 2011)
Semi-natural forest habitat / EU-27		€6 billion a year	Thinning, protection, replanting native species etc	€40		(Hart et al, 2011)
Peatlands and blanket bog /	LIFE project to restore active blanket bog in mid	£2.9 million, of which 55%	Drain blocking	£1.30 - £5.50 per metre	Improvements to water flow and quality,	(RSPB, 2011)

Ecosystem / location	Restoration project/example	Overall cost	Restoration actions	Cost per ha (units vary)	Ecosystem service benefits	Source
Wales	and north Wales	spent on practical work	Tree removal	~ £1,000	increased carbon storage	
Peatlands and blanket bog / Ireland	LIFE project to restore active blanket bog in Western Ireland	€4,078,042	Drain blocking	€1.50 - €30 per drain		(le Gear, 2006) (Murphy, 2008)
			Tree removal	~ £1,000		
Peatlands and mires / Germany	Mecklenberg-West Pomeria programme to restore/protect peatlands	-	Subsidies for sympathetic agricultural practices and alternative land uses	€5,000	10 tonnes of avoided CO2 emissions/Ha, water retention, biodiversity conservation	(TEEB, 2011)
Wetlands / Bulgaria	Wetlands Restoration and Pollution Reduction Project	\$13.28mn Of which \$5.03mn on wetlands restoration and \$7.16 on protected areas management	Restoration of 2,340Ha of former marshland (projected) Management of protected areas (including monitoring, education, capacity building and guidelines on nutrient reduction)		Pollution reduction, water retention, fish nursery habitat, biodiversity conservation, habitat provision of important wetlands, recreation and tourism	(Ministry of Environment and Water, 2002)
Floodplain / River Danube	Floodplain restoration along the lower Danube	€183mn	-	€183mn for 2,236km ²	Flood protection and other services worth €500/Ha/year	(Hulea et al, 2009)
River Dee / Scotland	LIFE project for restoration of River Dee as salmon habitat		Creation of buffer strips	£15.41 per adult salmon	River flow control, biodiversity conservation, habitat provision, aesthetic value	(Scottish Natural Heritage, 2011)
			Coppicing	£2.54 per adult salmon		
			Removal of obstructions	£27.56		
			Instream habitat creation	£7.75		
River habitats / Wales	LIFE project for restoration of the River Avon in Wiltshire and Hampshire	£4 million (budgeted)	Restoration	£150,000/km	Flood control, habitat provision, biodiversity conservation	(Natural England, 2009)
			Bed raising	£180,000/km		
			Narrowing	£200,000 – 400,000/km		
			Landscaping	£1,000/km		
			Fencing	£6,000/km		

Table 2.2 Examples of sustainable use zones costs

Ecosystem / location	Restoration project/example	Overall cost	Restoration actions	Cost per ha (units vary)	Ecosystem service benefits	Source
Agricultural soils / EU 27	Range of soil organic management practices	€3.5 billion across 30.5 million Ha	e.g. conservation tillage	€59 per year		(Hart et al, 2011)
			buffer strips	€230 per year		
			conversion of arable land into forest	€299 per year		
			terracing	€893 per year		
HNV grassland / EU-27	Restoration and conservation of agricultural grasslands through agri-environment schemes	-		€169		(Hart et al, 2011)
Semi-natural grassland / Finland	Agri-environment grazing to restore semi-natural grassland in Finland	Various, dependent on grazing regime	Grazing at various intensities to suppress scrub development	£300 per year		(Van Teeffelen et al, 2008)
Agricultural habitats / Germany	Restoration and conservation of habitats and biodiversity in farmed landscapes in Germany	€2,300,000	Maintenance of traditional grassland	€500 per year	Biodiversity conservation, habitat provision, soil protection	(Hart et al, 2011)
			Extensification of highly productive grassland	€1,000 per year		
			Protection of wild field flora	€300		
			Protection of structural elements within arable land	€700		

Table 2.3 Total costs of practices to address soil erosion and organic matter content issues

Practice	Area to be managed (ha)	Unitary one-off costs (€/ha)	Unitary annual costs (€/ha)	Total one-off costs (€)	Total annual costs (€)	Comments
Contour tillage	515,793	0	20	0	10,315,860	
Reduced/conservation tillage	516,243	0	0	0	0	
Soil conservation structures	79,041	2,500	125	49,400,579	9,880,116	Build in 25 per cent of area; maintain in 100 per cent
Natural vegetation on edges of fields and rural tracks and water banks	516,243	0	50	0	25,812,136	Hedgerows not considered.
Keeping overwinter stubbles	142,856	0	28	0	3,999,958	Cost of crop rotation not included
Green manure	111,316	0	44	0	4,897,899	
Change crop rotations/increase fallow index in crop rotations	143,305	0	32	0	4,585,772	
Vegetation strips	515,793	CALCULATED CROP BY CROP		83,262,015	50,554,646	
Mulching using crop residues	261,622	0	136	0	23,838,963	Calculated for 2 applications every 3 years
Non-harvested fringes on annual rain fed crops	142,827	0	0	0	0	Vegetation fringes considered instead
Addition of exogenous organic matter	397,525	0	400	0	52,473,255	1 application every 3 years
Forestation of agricultural lands	2,618	1,800	500	4,712,491	1,309,025	
Total				137,375,085	187,667,630	

Source: Hart et al (2011)

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