

Local Information Flows and Decision-Making Requirements

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ABSTRACT

This enquiry characterised the use of information on biodiversity and ecosystem services in the environmental decision making process at the local (as opposed to national) level. Data were collected from nine case study areas, in eight countries, to explore local requirements across a range of governance systems and bioregions in EU and accession states. A strong demand for information was noted across all the case studies, with some variation in needs between societal groups. This contrasted with a substantial proportion reporting considerable difficulty in acquiring the necessary information for decision making. This was particularly true for detailed habitat data. Although the internet was commonly used to search for information, much of the data accessed was not stored on computers and not regularly updated or spatially referenced. Notably, the highest perception of these impediments to data access occurred in the stakeholder groups that also indicated the greatest requirements for information.

INTRODUCTION

The work described in this chapter was designed to gather information at the local level, in rural areas, to complement the information collected concerning the national level in described in Chapter 2. This local enquiry gathered data from nine case study areas, in eight countries, to characterise the use of information on biodiversity and ecosystem services in the environmental decision making process. Conducting the survey across a range of countries allowed the enquiry to consider local requirements across a range of governance systems and bioregions in EU and accession states.

At the local level, the decisions include formal processes like SEA and EIA, as at higher levels of governance, but also local planning applications, and the myriad informal decisions made by communities and individuals that are small-scale individually, but summate to change the environment.

The enquiry at local level therefore considered (i) local administrations involved in formal assessment and planning decisions, including participatory processes, and informal decisions for managing public land or guiding community actions; and (ii) informal decisions by local stakeholders.

The enquiry addresses the following questions relating to the flow of information on biodiversity and ecosystem services at the local level:

- What are the information needs?

- What determines the information needs?
- What information is used?
- What information is needed but currently unobtainable?
- What are the barriers to obtaining information?

Analysis provides insights into the relationships between the utilization of such information, and key differences between the case study areas. Such differences might include their environmental governance, the nature and extent of community participation, land-use, and status in terms of biodiversity conservation.

BACKGROUND

Paradoxically we are not limited by lack of knowledge but failure to synthesis and distribute what we know (Pimm et al. 2001)

Environmental Data Availability

In order to make choices that are appropriate and informed, decision makers at all levels need ready access to environmental data that is relevant, up to date, appropriately scaled and in a format that is fit for purpose. Unfortunately, despite the huge growth in capacity for data gathering, storage, and dissemination in recent decades, the authors of the Millennium Ecosystem Assessment (MA) (2005) concluded that “Effective management of ecosystems is constrained both by the lack of knowledge and information about different aspects of ecosystems and by the failure to use adequately the information that does exist in support of management decisions.”

The MA identified specific gaps in information availability that hindered decision making for managing the environment. These included:

- Major gaps in global and national monitoring systems resulting in the absence of well-documented, comparable, time-series information for many ecosystem features and that pose significant barriers in assessing condition and trends in ecosystem services. Moreover, in a number of cases, including hydrological systems, the condition of the monitoring systems that do exist is declining.
- Poor availability of *processed* remotely sensed data on land-cover, despite three decades of data production.
- Major gaps in information on non-marketed ecosystem services, particularly regulating, cultural, and supporting services.
- Limited information on the distributions of many important species.

They concluded that more information is needed concerning:

- the nature of interactions among drivers in particular regions and across scales;
- the responses of ecosystems to changes in the availability of important nutrients and carbon dioxide;
- nonlinear changes in ecosystems, predictability of thresholds, and structural and dynamic characteristics of systems that lead to threshold and irreversible changes; and,
- quantification and prediction of the relationships between biodiversity changes and changes in ecosystem services for particular places and times.

Major initiatives have now been set up that address some of these issues and examples of these can be found in many areas of the world. For instance, many areas now have regional or national data repositories e.g. the [National Biological Network](#) (UK), the North American Biodiversity Information Network (NABIN), and the [Canadian Geospatial Data Infrastructure](#).

As environmental data from many different organisations is compiled across boundaries, for increasingly large geographic areas, the need to ensure compatibility becomes increasingly

challenging and this is currently the focus of much international effort (Table 1). For example, the [Global Biodiversity Information Facility](#) (GBIF) aims to register all specimens in botanical, paleontological and zoological collections around the world, and make this information freely available on the Internet. One of GBIF's main purposes is enabling a global distributed network of interoperable databases that contain primary biodiversity data (data associated with specimens in biological collections, as well as documented observations of plants and animals in nature). The Dutch national node of the GBIF is the Netherlands Biodiversity Information Facility ([NLBIF](#)) that provides species distribution maps which are utilised for site specific planning (H. de Iongh, personal communication).

Table 1. Examples of systems for enabling access to environmental data and analysis tools and incorporating local communities in environmental modelling and decision-making.

Project	Details
INSPIRE Directive Infrastructure for SPatial INformation in Europe http://inspire.jrc.ec.europa.eu/ 2007-2012	Designed to support EU environmental policies, and policies or activities which may have an impact on the environment. It will provide access to spatial or geographical information from 34 spatial data themes from a wide range of sources, from the local level to the global level, in an inter-operable way for a variety of uses. The target users of INSPIRE include policy-makers, planners and managers at European, national and local level and the citizens and their organisations. Possible services are the visualisation of information layers, overlay of information from different sources, spatial and temporal analysis, etc.
InVEST – Integrated Valuation of Ecosystem Services and Tradeoffs http://www.naturalcapitalproject.org/ConEX.html	A natural capital modelling and mapping tool produced by the Natural Capital Project, Stanford University, California. Software tool, in beta release, to support environmental decision making by helping users visualize the impacts of potential decisions, identifying tradeoffs and compatibilities between environmental, economic, and social benefits.
The InterAmerican Biodiversity Information Network (IABIN) http://www.conservationcommons.org/media/document/document-a3gvyi.pdf	IABIN is both an Internet-based information resource with common infrastructure and content, interoperable through the use of common standards, and a forum for institutions and individuals to discuss the issues related to sharing and exchange of biodiversity information. Its mission is to promote compatible means of collection, communication, and exchange of information relevant to decision-making and education on biodiversity conservation.
Linking Ecological Monitoring to Decision-Making at Community and Landscape Scales EMAN http://www.eman-research.ca/eman/reports/publications/2005/camesa/CAMESA.pdf	EMAN is exploring appropriate mechanisms to link community monitoring to decision making in landscapes and watersheds. This changes the dynamics in identifying the relevant decision making regime, in characterizing and delivering needed information, in defining sustainability and in choosing between policy options and trade-offs. Such a scale is required to manage and improve wildlife habitat and biodiversity, water resources, and sustainability in complex cultural landscapes.

Environmental Information for Rural Land Management

In addition to the challenges of data compatibility between organisations, and across national boundaries, many further factors need to be addressed in order to provide an effective flow of environmental information that is suitable for enhancing decision-making for land management. Theobald *et al* (2005) identified four ‘fundamental challenges’ to providing effective ecological support to rural land-use planning.

1. *Mismatch of scales* - a mismatch between the spatial and temporal scales of ecologist’s understanding of systems and those where land-use decisions occur may render information less useful. Scale issues have long been recognised as a key concern in ecological science (e.g. Gontier 2007; João 2007; Wheatley & Johnson 2009). Information may be recorded at scales determined by limitations of the original survey design or technologies.
2. *Lack of evaluation* – there is a need to address a lack of systematic or critical evaluations of the efficacy of ecological information on land-use decision outcomes. There is a need to determine “how ecological information is used, how it can be improved, and what different information is needed.” In reference to the [Natural Diversity Information Source](#) website, Theobald *et al* (2005) ask: “How many land-use decisions have been influenced by it? How many times have the maps been considered during land-use hearings? How many county supervisors, planning and zoning commissioners, or interested citizens have visited the website?” The surveys described in Chapters 2 and 3 help address these questions.
3. *Poor classification systems* – there is a need for improvements to the organisation of land-use classification systems and the cataloguing of management or activities. Broad or inappropriate classes of either of these impede efficacious use of information in decision-making. When working across national boundaries, all of these classifications become increasingly challenging. Theobald *et al* (2005) note that cultural and linguistic differences in the understanding of both land use classes and management activities need careful assessment and clear definition.
4. *Adaptive management* – better use of ecological information would enable adaptive management (Holling 1978) in rural land use decision-making. In other words, ecological information needs to be updated through effective monitoring schemes in order to evaluate and adapt management regimes. Here, engagement of local communities and individuals may often be key to the successful implementation of the long-term commitment required for adaptive management.

An additional challenge is the incorporation of predictive ecological models into the data repositories in order to transform raw information into more sophisticated tools. This challenge is core to the TESS project and other concurrent research e.g. the InVEST tool for modelling natural capital (Table 1).

Participation of Local Communities in Environmental Decision-making

Enabling more effective information exchange between local communities and the tiers of government that influence them should allow a move away from the “tyranny of small decisions” where policy is ineffective (Odum 1982) and local communities are disenfranchised. The importance of local management consultation in rural areas is increasingly recognised. For instance, (Morgan-Davies *et al.* 2005) used a consultation process with farmers, land managers and conservationists to demonstrate a mismatch between agri-environment policy and schemes in Scotland. They acknowledged that some difficulties may be solved through changes under CAP reform but highlighted the need for the use of local knowledge to enable schemes to reflect regional needs and they suggest the adoption of a local area farm plan approach. This could take into account environmental conditions, traditions, livestock management and biodiversity conservation issues and economic opportunities and constraints.

Environmental management (and decision making) is as much about managing human activities as managing land and water; therefore requiring the effective engagement of all stakeholders (including government agencies, NGOs, the business community and the general public) in the process of information gathering and policy making. Luz (2000) describes how landscape ecological planning has been primarily the domain of the natural sciences but a lack of communication between scientists, planners, administrators and local stakeholders can hamper the implementation and acceptance of landscape planning projects.

Participatory methods are advocated on the basis that public awareness and participation play an equal role with expert views of natural scientists and planners. Participation engenders a sense of ownership of information and policymaking resulting in a common understanding of issues and a negotiated learning process. Participation is an educative process for both stakeholders and policy makers and results in the empowering of people by increasing the skills of communities, groups and individuals to make better decisions for themselves. Commentators on the benefits of participation, such as Reed (2008) identify ‘normative’ and ‘pragmatic’ arguments where normative focuses on benefits for democratic society, citizenship and equity and pragmatic arguments focus on the quality and endurance of participatory environmental decisions. However, despite the rhetoric on the benefits claimed for participation, there has been some disillusionment amongst practitioners and stakeholders, relating to the degree (Arnstein 1969) and nature of participation, and research is on-going on best practice to engage relevant stakeholders at the right time and in the right manner. Tippet et al (2007) seek to define a new mode of participatory ecological design through the use of a systems thinking framework to integrate participatory approaches within ecological planning.

In addition to effective engagement of local community members there is also the issue of engaging academic ecologists in the day-to-day decision-making within the planning process. Ecological science needs to be framed in the social and economic context of the local region and the academics concerned will benefit from active participation resulting in a working knowledge of environmental decisions within the planning process (Broberg 2003).

Box 1. Background to public participation

Public participation may be defined as “the process by which public concerns, needs and values are incorporated into governmental and corporate decision-making. It is a two way communication and interaction with the overall goal of better decisions that are supported by the public” (Creighton 2005). The term may be distinguished from ‘stakeholder involvement’ which would include those affected by a decision in addition to those who are able to influence its outcomes (Jansky et al 2005). The Sustainable Development Commission provides a useful definition of a ‘Stakeholder’ as “anyone who has an interest or ‘stake’ in the subject or the engagement process under discussion – from interested agencies and organisations, to local communities and individuals. It is often used to distinguish interested parties from the (general) public”. For the purposes of this report ‘participation’ will be used as a term to include all ‘stakeholders’ including the public.

In the international context, Principle 10 of the Rio Declaration on Environment and Development (UNCED 1992) states that environmental issues “are best handled with the participation of all concerned citizens” which is further re-enforced by paragraph 26 of the Johannesburg Declaration on Sustainable Development (WSSD 2002) acknowledging the requirement for “broad based participation in policy formulation, decision-making and implementation at all levels”. Nations are encouraged to facilitate public participation through methods that increase i) transparency, ii) participatory decision-making and iii) accountability. In Europe, these principles are reflected in the ‘three pillars’ of the Aarhus Convention (UNECE 1998): Access to Environmental Information, Public Participation and Access to Justice. This reflects the universal recognition of the great importance of involving the wider public in policy making for environmental protection and sustainable development.

Policy commitments are now being made by national and local governments and a range of agencies in both the public and private sector to expand participation in their decision-making processes. In many countries, part of the political agenda for improving governance at national and local level is the promotion of community capacity building across a range of policy areas including spatial (or land use) planning. Participation is an integral part of both Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) and in many countries, for example in the United Kingdom, participation is a mandatory requirement for all planning decisions.

METHODS FOR SURVEY AND ANALYSIS

Researchers in each of the partner countries completed desk studies and a series of structured interviews to characterise the TESS case study areas and to evaluate the supply and demand of environmental information and its use in decision-making for activities that affect biodiversity and related environmental concerns.

Selection of Case Study Areas

The case study areas were all situated in rural areas but were selected to represent a range of governance systems and landscape types (Table 2).

For each case study area, the TESS partners identified the two lowest tiers of government and at least six local stakeholders from distinct sectors (e.g. forestry and farming) who would all be involved, in some way, in environmental decision-making. At the same time as seeking to represent a range of conditions, efforts were made to find tiers of government and stakeholder representatives that were as equivalent as possible between countries. The Eurostat Nomenclature of Territorial Units for Statistics [NUTS](#) classification system (Eurostat 2008), which defines regional units of a general nature, was used to guide selection of the two tiers of local government. As *local* levels of government were sought, the general rule was to collect data from administrations below the level of NUTS 3. In many countries these NUTS 3 regions correspond with counties. Units below NUTS 3 are now defined as Local Administrative Units (LAU) formerly classified as NUTS (4 and 5). In most cases the lowest, or most local, tier of government for this study (Tier 1) was generally also defined as a LAU 2 (previously NUTS 5). The tier above (Tier 2) this would generally be listed as LAU 1 (previously NUTS 4).

However, the diverse histories, cultures and governance systems across both member and accession states of the EU inevitably result in an imperfect match between the tiers of government of different partner countries in this project. This complication has been discussed at length in other research commissioned by the EU. For instance, in an FP7 project “Assessing the Impact of Rural Development Policies (RuDI)” many complexities were encountered when attempting to apply the EUROSTAT system in Estonia (Peepson & Mick 2008).

Table 2. Case Studies. Further details on the characteristics of each area formed part of this study and are presented in the results section.

Country/ Case study	Landscape
Estonia/ Keila Parish, Harju County	The parish is located on the coast of Baltic Sea, coastal landscape with sandy beaches or limestone cliff, woodlands (mostly pine forests), agricultural landscapes with small villages, area with high recreational value.
Greece Lake Kerkini (Kerkini municipality)	Municipality of Kerkini consists of smaller settlements, many of those around Lake Kerkini. It includes the Lake's wetland, coastline, forests, agricultural lands, a river branch with high conservation interest, fishery, forestry, tourism, agriculture, wild life.
Hungary Bózsza	Bózsza is a small village in the middle of Hegyköz small region. It is in the Zemplén mountains close to the Slovakian border. 57 % of the area is covered by deciduous forests. Agricultural fields are only on 25% of the total area in the valley. The main activities are forest management, agriculture, hunting and different kinds of tourism. More than half of the area is designated as national park or other Natura 2000 area.
Poland Zator	The district of Zator is situated within a region called the Carp Valley, which covers an area of a historical carp husbandry. Fishing ponds are spread across hundreds of hectares in the valley of Skawa and Vistula rivers. The district consists of the town of Zator and nine villages. The landscape is characterised by domination of agricultural land and fishponds. Forests are almost absent whilst some woodlands are scattered over agricultural areas and along borders of fishponds and roads.
Portugal S. Brás de Alportel	A hilly landscape covered by vast expanses of evergreen oak forests, ranging from almost pure cork oak stands to complex Mediterranean maquis with dominating cork oaks surrounded by tall strawberry trees <i>Arbutus unedo</i> and tree heath <i>Erica arborea</i> . Forest stands are often interspersed with nearly monospecific gum cistus <i>Cistus ladanifer</i> scrub or more diverse Mediterranean heathland. The main economic activity in rural areas is the production of cork, generally conducted on small private estates (<10 ha) by aged landowners (often > 60 years).
Romania Sfantu Gheorghe, Danube delta	A small village surround by large natural habitats including wetlands, coastline, wild beaches, natural levees and large river channels with high conservation interest, fisheries, cattle breeding and tourism.
Turkey Camlihemsin, Firtina valley	The Firtina Basin is situated on the northern skirts of the Eastern Black Sea mountain range, the backbone of the West Lesser Caucasus corridor in Turkey. The valley is formed around the Firtina River and its two main tributaries, which together carry the chilly waters of the Kackar Mountains down to the Black Sea. It is a typical example of a number of rapid flowing river systems along the Black Sea coast, running parallel towards the sea. The slopes of Firtina Basin are reach up to 3,992 m from the sea level within 45 km. The average annual precipitation is over 2,000 mm; higher altitudes are covered by wet clouds most of the time.

Country/ Case study	Landscape
Turkey Eğirdir	Eğirdir Lake Basin covers an area 3,309 km ² , including the 479 km ² Lake Eğirdir at an altitude of 917 m and average depth of 10-12 metres. The lake is 50 km long on north-south axis, and 3-15 km wide on east-west axis. The mountains in the lake basin are partly covered by forests, dominated by pine and red pine, with random populations of oak, juniper, cedar and fir. The most significant plateau is Barla plateau, with soil from limestone and clay and the slope varies up to 40 %. Some significant plains, the most important of which is Boğazova, lie between the mountains.
UK Arne Parish, Dorset	A matrix of mainly grassland agriculture, lowland heath and woodland with villages, some extractive industry, high conservation interest and tourism.

Desk study

A ‘synopsis’ document was produced for each case study giving textual detail on relevant aspects of the systems of local governance for environmental decision-making, the availability of suitable data to inform these decisions and information on communications and community engagement. These summaries also provided details of the environmental and social characteristics of each case study area.

The ‘synopsis’ documents gathered the following information:

- Case study details
- Synopsis of local environmental decision-making
- Environmental decision-making and the Local Administration
- Local Government Framework
- Local Government Role
- Local – Regional - National Government Links
- Local-Local Government Links and Community Engagement
- Planning for local environmental decisions
- Stakeholders – ‘Who is involved in making and influencing local environmental decisions in your case study?’
- Data used for local environmental decisions
- Local data on biodiversity and ecosystem services
- Regional data on biodiversity and ecosystem services
- National data on biodiversity and ecosystem services

Structured interviews – selection of interviewees

A series of structured interviews was conducted with selected government and community representatives within each case study. Interviewees were selected from the two tiers of local government. Both officials and elected representatives were interviewed where relevant in order to obtain responses with a good potential for reflecting the circumstances in that area. If possible, a number of officials with a range of roles were interviewed simultaneously and provided agreed responses to the survey questions.

In order to survey the functions of stakeholders in the community in environmental decision-making, a sample of individuals were found and interviewed within each case study. Stakeholder categories relevant to all included countries while also providing a good range of types of interest and activity were selected by consultation with representatives of each country. The main criteria for selection were that they were (i) widely engaged in managing land or species, or with potential for contributing to this, and (ii) ideally organised at national

and European level, so that a single contact point in Europe could in principle arrange contacts at local level.

It was also important that most types of stakeholder would be likely to be represented within each study area. Although the ideal was for each partner country to locate a representative for each stakeholder category, in practice there were some case studies where the landscape type or economic activities in the case study made it necessary to omit certain categories.

The following categories were used and the typology of the interviewee's status (public/ voluntary/ NGO/ non-profit/ private) was also recorded.

- Farming and rural business
- Forestry & non-timber products
- Fisheries and angling
- Hunting & recreational animals
- Nature watching and reserves
- Recreational access

Although an offer was made to contact stakeholders through federated national organisations at national level, in practice contacts were made locally. This was done either by direct knowledge of researchers within the areas or on advice from the local administration or the combination of these approaches.

Structured interviews - interview approach

Each interview consisted of initial contact and explanation of the aims of the survey to familiarise the interviewee(s), followed by a face-to-face visit by a researcher or representative. The representative worked through a nine page survey form (Table 3) providing explanation where required. This approach allowed the project to cover a broad area within a complex topic that could not have been accomplished through a more simple and limited unsupported questionnaire. The topics dealt with the environmental responsibilities of the interviewee as an individual or a representative of an organisation, their community engagement and the way in which they used, or were unable to use, environmental information in their decision-making.

Table 3. Topics covered by the survey forms used during the structured interviews to gather information on environmental decision making.

Page	Topic	Questions
1	Capabilities for nature conservation and management	13 plus details
2	What determines your needs for information when making decisions affecting the environment?	7 plus details
3	Participatory processes and objectives	14 plus details
4	Ecosystem Services: benefits of wild resources	13 plus details
5	Environmental costs and other issues within your administrative area	Open question
6	Environmental information sources for decision-making	6 plus details
7	What biodiversity and ecosystem services information do you need in order to make environmental decisions?	Matrix – 50 questions
8	Are you currently able to access the required data?	Matrix – 50 questions
9	Reasons for being unable to access any required data.	Matrix – 50 questions

RESULTS AND DISCUSSION

Characteristics of the Study Areas

It was crucial to obtain contextual information on both the natural and socio-economic environment in the case study areas to enable interpretation of the differences and synergies between the ways in which environmental information was used in the partner countries. Governance systems varied between the countries but they always involved local authorities,

such as municipalities or parish councils. There may also be strong governance from specialised government agencies, which may be identified as a Tier of governance for the purposes of this study (e.g. Greece Tier 2).

At the lowest level of government (Tier 1), the study areas ranged in size from 1,489 ha to 63,984 ha, with population densities varying between 2 and 176 per km², with a median of 46 per km² (Table 4). In comparison, the average density of the European Union's 490 million people on a territory of 4.46 million km² is 112 per km², close to 1 citizen per hectare.

The landscape types represented by the case studies also varied considerably, with some sites dominated by agricultural land, others by forestry, wetlands or heathlands (Tables 4 and 5). All study areas included parts that were designated for nature conservation but the extent of this area also varied from less than 10% to more than 50%. In comparison, Natura 2000 covers 17% of the land area of the EU.

This variety of case study types satisfied the requirements of this study to consider the use of environmental information in decision-making at a local level across a representative selection of case studies. With this approach, the range of results obtained is generally of more interest than generalities, such as average values for the survey questions.

Table 4. Summary of the characteristics of the case studies with details for the area delimited by the most local level of government denoted as Tier 1 in TESS and generally listed by EUROSTAT LAU2 (previously NUTS 5).

	Estonia	Greece	Hungary	Poland	Portugal	Romania	Turkey	Turkey	UK
Case Study Name	Keila Parish,	NO TIER 1	Bózsza	Zator	S. Brás de Alportel	Sfântu-Gheorghe	Çamlıhemşin Firtina valley	NO TIER 1	Arne Parish
LAU	2		2	2	2	2	N/A		2
Area (ha)	17,900		1,639	5,144	15,337	63,984	1,489		2,962
Population (density/km ²)	4,700 (26)		205 (13)	9,026 (175)	10,032 (65)	971 (2)	1 457 (98)		1 370 (46)
% Area nature cons. designation	10		53 (Hegyköz)	60	52.3	35.7	Not available		65
Designations	Landscape Reserves Parks; Natura 2000; National Park		National Park	Natura 2000; Nature reserves	SPA, SCI	Ramsar ; SPA; SCI; UNESCO Biosphere Reserves; SAC	Not available		SSSI; SNCI; Ramsar; SPA
% Area other designation				60	65.5	64.2	Not available		96
Designations				Landscape Parks; Nature & Landscape Complex	REnc (National Ecological Reserve)		Not available		AONB
% area									
Agriculture	25		25	52	21.2	0	Not available		40.3
Forestry/ Woodland	42		57	6	41.2	17.5	Not available		13.4
Wetland /fresh water	7		Not available	22	1.0	80.8	Not available		18.8
Heath/ Moorland / Upland	0		Not available	0	33.1	0	Not available		11.2
Buildings & roads	2.5		Not available	Not available	3.6	0.3	Not available		2.9
Other land (e.g.)Coast	4.5 military; 1.7 mining					1.5 (levee, bare ground)	Not available		13.4

Table 5. Summary of the characteristics of the case studies with details for the area delimited by the second most local level of governance denoted as Tier 2 in TESS and generally listed by EUROSTAT LAU1 (previously NUTS 4).

	Estonia	Greece	Hungary	Poland	Portugal	Romania	Turkey	Turkey	UK
Case Study Name	Keila Parish,	Municipality of Kerkini	NO TIER 2	Powiat Oświęcim	S. Brás de Alportel	Tulcea	Sub Governorship Çamlıhemşin	Eğirdir	Purbeck
LAU	1	1		1	1	NUTS3	N/A	N/A	1
Area (ha)	17,900	35,400		40,600	15,337	853,441	104,245	177,880	40 442
Population	4,700	10,037		155,000	10,032	256,491	6,747	39,064	45 199
% Area nature conservation designation	10	15.5			52	7.1	63	31	29
Designations	Landscape Reserves Parks; Natura 2000; National Park	Ramsar, Natura 2000		Natura 2000; Nature Reserves	SPA; SCI	Ramsar Site; SPA; SCI; UNESCO Biosphere Reserves; SAC	National Park and Wildlife Reserve	Drinking Water Reservoir; Natural SIT Area; National Park	SSSI; SNCI; Ramsar; SPA; SAC
% Area other landscape designation					65.5	92.9	37		73
Designations				Protected Landscape; Landscape Parks; Nature & Landscape Complex	REN ^c (National Ecological Reserve)				AONB; Greenbelt
% area									
Agriculture	25	29		55	21.2	42.9	0.3	37	62.5
Forestry/ Woodland	42	57		11	41.2	16.1	63	47	17.0
Wetland /fresh water	7	9		Not available	1.0	30.9	0.2	13	3.8
Heath/ Moorland / Upland	0			0	33.1	0	36.5		10.3
Buildings & roads	2.5	4		Not available	3.6	3.2	Not available	3	2.7
Other land (e.g., coast)	4.5 military; 1.7 mining				0	6.9 (lagoon, bare ground)	Not available	0	3.7

Environmental Decision-making at the Local Level

The aims included identifying local environmental information needs. To do this, the survey needed to determine who was making local decisions, the key issues that concerned them, and the nature of their *perceived* information needs.

Who requires information?

Across the study areas, a great range of organisations and individuals were identified who would be involved in either making decisions about the environment due to their role as land managers or who would seek input to environmental decisions (Table 6). The six stakeholder groups identified for the structured interviews provide a good representation across the range identified here.

Table 6. Categories of decision makers defines in the case study areas – combined for all areas.

LAND MANAGERS			
Private	Public	Community	NGO
Farmers,	Government -all levels	Local associations: farming, fisheries, hunting,	Nature conservation
Foresters,	Government agencies: environment, nature, water, sustainability, heritage, agriculture and rural affairs	Local partnerships- e.g. for nature and heritage conservation	Wildlife
Horticulturalists,			Ornithology
Sport fishery /Anglers			Heritage
Hunters	National parks	Village boards and partnerships	Hunting
Aquaculture	Forestry		
Tourism	Research institute		
Recreation			
INTEREST GROUPS			
Commercial	Environmental groups	Recreational groups	Community groups
Tourism including ecotourism & agrotourism	Wildlife and nature conservation	Tourism	Residents association
	Green movement	Recreation	Women's groups
Extractive industries	Ornithology	Access to land	Farming / forestry / angling and hunting associations
		Outdoor sports (e.g. cycling, canoeing, skiing, horse-riding)	Local heritage association
		Gardening	Volunteer fire fighters

What activities in the case studies might require environmental information?

Within the structured interviews, a range of questions were asked to determine levels of engagement with environmental management, and particularly, nature conservation. Both Tiers of government had responsibility for the management of some aspect of the environment. When questioned in detail, fewer engaged specifically in conservation management and protection of wild species/habitats and even fewer in restoration of

species/habitats. Notably a relatively high number of Tier 2 local authorities engaged in environmental restoration and protection.

Collectively, 75% of the individual stakeholders stated that they had responsibility for some form of environmental management. This proportion was lower for conservation management and protection of wild species (44%) and for restoration of wild species and habitats (30%). This reflects the general pattern shown by Tier 1 of Local Government. Forestry, hunting and nature conservation showed most engagement in all categories. A perceived responsibility for nature conservation management was recorded for fewer than half of the case studies for the stakeholder categories access, fishing (angling) and farming.

Interpretation of the results may be aided by noting that the Nature Watching and Reserves category of stakeholders combined groups with considerably different needs. It may have been helpful to consider nature reserves separately for a clearer analysis. In this case, it is unlikely that the nature reserves category would have lower than 100% responsibility for conservation management, there might however, be differences in engagement with protection and restoration work.

Estimates of the numbers of environmental decisions made by interviewees and the organisations they represented varied considerably. This needs to be interpreted with caution, as although the interviewer would aim for consistency, there may be differences in the ways in which the decisions are estimated. For instance, there may be different definitions of what constitutes a single decision. Despite this caveat, it is clear that there were considerable differences between countries with some reporting zero or one decision and others very many, with median values between six and 33 per year. With regard to formal and informal decisions, a broad range of responses were found across both Tiers although one may discern a higher propensity for ‘informal’ decisions at Tier 1 level and a higher number of ‘formal’ decisions at Tier 2 level (Table 7).

Table 7. Estimated numbers of decisions on environmental matters made annually by local government and other stakeholders in the partner countries.

	Formal planning decisions			Informal decisions		
	Min	Max	Median	Min	Max	Median
Tier 1	0	50	10	0	300	16
Tier2	1	700	33	0	50	8
Stakeholders	n/a	n/a	n/a	0	365	10

The number of decisions made by the interviewees is likely to be affected by the characteristics of the area that they manage, including the total area. The area managed varied considerably from a minimum of 8 ha to a maximum of 42,000 ha. When the number of decisions is considered in the context of area, relative number of decisions made by farmers is by far the highest of any of the groups studied (Figure 1). This also should be interpreted with caution due to the many possible interpretations of a decision. All decisions will not have equal importance and it may well be that a single decision made by a stakeholder managing a large area may have far greater consequence than a large number of minor daily decisions.

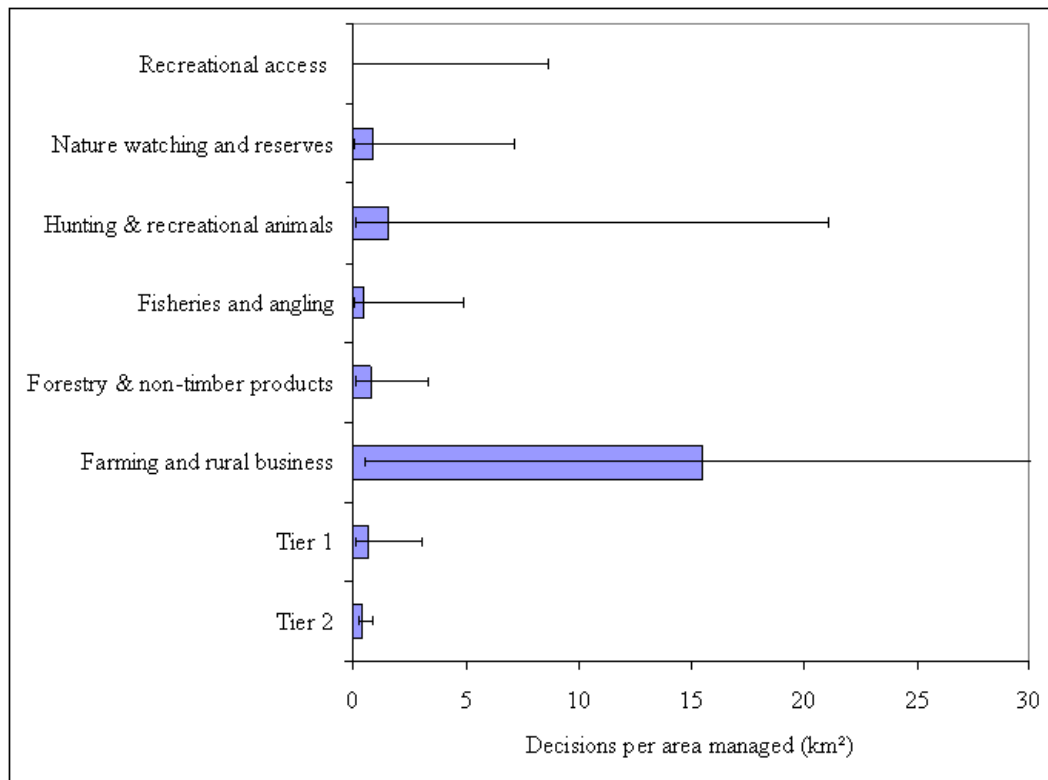


Figure 1. The number of decisions that affect the environment made per area managed for each stakeholder category and tier of local government.

Interviewees were asked, when making formal and informal decisions, what percentage of time is spent on consideration of the environment, society, jobs, costs and other matters. Tier 2 Authorities spent a higher percentage of time considering environmental matters whilst Tier 1 Authorities' considerations were dominated by societal issues. The greatest proportion of time, for the individual stakeholders, is spent on economic considerations.

Engagement with statutory requirements for impact assessment

Tier 2 governments in the case studies indicated a higher propensity to engage with the Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) processes, much as would be expected, since these are statutory requirements requiring a degree of professional expertise and staffing not commonly employed at the very 'local' level of government.

What are the key issues in environmental decision-making?

In the structured interviews, respondents identified key issues for which environmental information would be needed to enhance decision-making capacity. These issues were clearly influenced by the natural and cultural environment of each case study, and typical examples included impacts of extractive industry, flood risk, water quality, water supply and tourism / recreation impacts. The issues could be categorised in a number of ways.

In this research, it was pertinent to group the issues by subject categories compatible with *categories of predictive models* suitable for integration into the TESS decision support system design (see Chapter 5). This categorisation was based on increasing complexity from a basis of air, water and soil through associated fauna and flora, which combined in ecosystems and then added human social and economic categories. Using these categories, the highest proportion of issues identified by both tiers of government were socio-environmental issues. This may somewhat reflect the greater breadth of this category in relation to the others.

However, it does show that the interviewees framed their issues in a sense that acknowledged links between natural and cultural systems.

The issues identified by interviewees were also categorised into subject areas that relate to the provision of ecosystem services and environmental hazards. There were very strong differences in the number of issues in the different categories, with physical hazards rating by far the highest for the most local tier of government reflecting the need to respond to immediate needs of the local population. These hazards include flood or drought risk as well as water, air and noise pollution. Similarly the Tier 1 administrations showed a concern for amenity areas not reflected so strongly by the next tier of government. Biodiversity conservation issues and tourism / access were frequently listed as important issues by both tiers of government but heritage conservation, surprisingly, was not listed. Issues relating to the provision of ecosystem services (e.g. forestry, fishing) were also rarely reported by government, perhaps because seen as commercial concerns.

Participatory Approach and Community Engagement

The nature and extent of community participation varied between countries, although the majority of local government respondents purported to engage to some degree with individuals, enterprises, NGOs and government agencies. Interviewees were asked to state the way in which they engaged in consultation and the participatory process with a choice of responses of never, occasionally, often, usually, always, and mandatory. This enabled a comparison to be made between the perceptions of the local governments and the individual stakeholders regarding the efficacy of this process.

The data were summarised using an index to represent each action (e.g. consultation, participation) for each data set.

$$\text{Index} = \sum \text{responses} \times \text{weight}$$

Where weight = Never = 0, Sometimes = 1, Usually = 2, Often = 3, Always = 4 and Mandatory = 4. 'Always' and 'Mandatory' received the same score to avoid bias of a higher index to the local governance. The mandatory option was not available as a response on the 'individual stakeholders' survey forms).

At the lowest level of government (Tier 1) the highest response rate across case studies was 'usually', although two countries reported that they 'never' engaged in consultations and actions for participation with private individuals and enterprises. At the second level of government (Tier 2), three countries stated that consultation and participation were 'mandatory' and none claimed 'never' to consult or engage the community. This pattern of responses would suggest that there might be a greater commitment or compulsion in Tier 2 levels of government to embrace a participatory approach with individuals and enterprises.

In contrast, the highest response rate across all individual stakeholders to the same questions was 'occasionally' or 'never' thus representing a mis-match between the responses of local government and perceptions of the stakeholders. This pattern varied somewhat between groups of stakeholders, with fisheries/angling and farming interests appearing particularly excluded.

This raises the question of the efficacy of the participatory processes used by local government, although it should be recognised that when consultees are dissatisfied with decisions or policy outcomes, the perception is often that the consultation process is flawed and their views have not been taken into account. Also, local governments may have a perception of regular consultation based on their outreach activities across many stakeholder groups; however, each individual may perceive this as much less regular.

The pattern of consultation fitted quite strongly ($P = 0.02$) with the proportion of respondents that were private, as opposed to public bodies, NGOs or non-profit organisations, in each stakeholder category. Although the samples of 6-10 stakeholders in only 6 categories is small,

it seems that consultation tends to be least when the stakeholders are predominantly in the private sector (Figure 2).

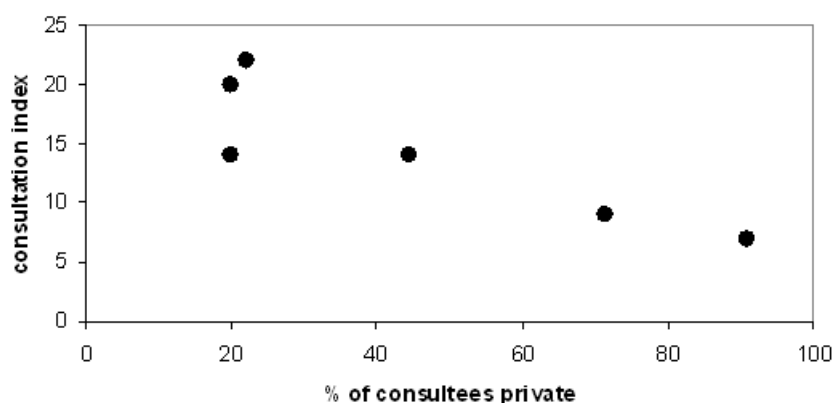


Figure 2. There was least consultation by administrations with stakeholder categories that were predominantly private.

Examination of the engagement of local governments and individual stakeholders with government conservation agencies and conservation NGOs was addressed using a similar set of response options and summary index (Never = 0, Sometimes =1 etc). For areas designated for nature conservation, government conservation agencies were thought to be consulted to some degree by all countries, at both levels of local government. However, these responses showed a considerable range across the 9 case studies. For instance, consultation by Tier 2 government with government agencies was a mandatory requirement in 3 cases, but only occasionally conducted in another 4 cases. The responses for consultation requirements in non-designated areas were also diverse. All groups of individual stakeholders engaged to some degree with the government conservation agencies and conservation NGOs but this varied between groups, with Nature Watching/ Reserves and Forestry respondents showing greater likelihood of consultation.

Engagement with conservation NGOs, was perceived to be less frequent than with government agencies across all groups of interviewees including local governments and individual stakeholders. Engagement with these NGOs was most frequently perceived as “occasional” by all groups of stakeholders. Notably, 30% of the individual stakeholders said they ‘never’ engage with conservation NGOs in non-designated areas and 38% purported to ‘never’ engage with them in designated areas.

When questioned on whether government agencies, conservation NGOs or pressure groups were able to exert *greater* influence on environmental decisions in relation to their own influence, a contrast was evident between local governments and the individual stakeholders. Local governments, at both tiers, perceived that government agencies exerted some influence, NGOs were thought to have less (generally occasional) influence and pressure groups were rarely perceived as being influential. In contrast, stakeholders affirmed the influence of government agencies but indicated that they also considered pressure groups to be influential. Interestingly, the individual stakeholders, in general, indicated that the influence of the various groups over environmental decisions was more significant than was reported by the local government respondents. This probably reflects a feeling of exclusion from participation in decision-making experienced by some individual stakeholders.

Information Sources for Environmental Decision-making

For each partner country, the survey examined the information sources that are available for environmental decision-making (Table 8), and then used the structured interviews to determine the information that was used by the different societal sectors to approach a variety of local issues that were identified by the interviewees.

There were major differences in information provision between the partner countries at the national, regional and local levels (Table 8). While national and regional databases of biodiversity and other environmental information are available in some partner countries (e.g. Portugal, UK), in others, the data were more fragmented in nature. Where national databases were available some limitations to their use may result from scale issues, such as aggregation to a scale too coarse for many purposes. Some data may be held by various government organisations and agencies but may not be available in databases that are accessible to all potential users. There are often partnerships between governmental ministries, agencies, and NGOs to develop environmental databases (e.g. Biodiversity Action Plans).

At the local level, many partner countries reported poor data availability, with uncoordinated data collection by disparate groups, resulting in a lack of compatibility and interoperability. Some data were subject to restricted access due to commercial restrictions or because it was not available in electronic format. Data in all countries originated from many local sources, including private commercial companies, NGOs and unofficial records kept by individuals. From the partner countries, only Portugal and the UK reported coordinated data repositories at the local level for their study areas.

Table 8. The main information sources available for biodiversity conservation and other related environmental decision-making identified for each country.

	Local	Regional	National
Estonia	Local government & enterprises (voluntary or compulsory)	No facilities for collecting, storing & providing biodiversity & other environmental data.	National environmental monitoring programme
Greece	Local municipalities, management authorities, local environmental groups & communities	The Prefectures keep official records mainly on hunting, tourism & forestry (about both species & services).	No national database. Forest inspection agencies, other government agencies, local municipalities, management authorities, environmental groups & NGOs.
Hungary	Poor & scarce data on local level. Databases MEPAR /forest management database /NATURA 2000) are not compatible on local level. Local municipalities and environmental NGOs can have fragmented information.	National Parks , regional inspectorates for environment, nature and water.	Green-Point Service of the Ministry of Environment & Water & Vegetation Heritage of Hungary . Under development: The Conservation Information System
Poland	Do not currently exist. No comparable & comprehensive databases on local level. Major mapping efforts are planned for Natura 2000 areas	No specific facilities. Research institutes & regional authorities, administration of protected areas & NGOs.	Natura 2000 network & GRID Center of UNEP . Under development; Integrated Monitoring of Natural Environment & Biodiversity Clearing House Mechanism
Portugal	Local government (local Biodiversity Action Plans/plans in urban biodiversity), local business (Business & Biodiversity initiative) & environmental NGOs	Regional development & coordinating commission, although the information is not organized in accessible databases.	Portuguese network of protected areas , Natura 2000 network , national conservation agency (digital library), environmental NGOs & environmental consultancies.
Romania	Local public institutions (representatives of environmental authorities, national research institutes) & NGOs.	Regional agencies & institutes	National government agencies & national research institutes
Turkey	Local government agencies (local directorates of ministries etc.), universities, regional governmental research institutes, & stakeholder groups (eg. farmer unions)	Universities, regional governmental research institutes (eg. Eğirdir Fisheries Research Institute), regional government agencies, regional NGOs	Universities, governmental research institutes, national databases (Turkish Statistical Institute etc.), government agencies, national NGOs
UK	Local Record Centres (LRCs)	Regional information gateways & government agencies	National Biodiversity Network Gateway , online national databases (MAGIC / MarLIN)

Types of information Required for Environmental Decision-making

Interviewees were provided with a matrix of types of information and requested to indicate which were required. These categories could be grouped into biodiversity and habitat information and the four types of ecosystem services as defined by the Millennium Ecosystem Assessment (MA 2005) (Figure 3).

It was evident that all of these broad categories of information were required to varying degrees by all the groups of stakeholders with the two tiers of local government and the nature watching and reserves stakeholder group and the forestry group showing the greatest overall need for information.

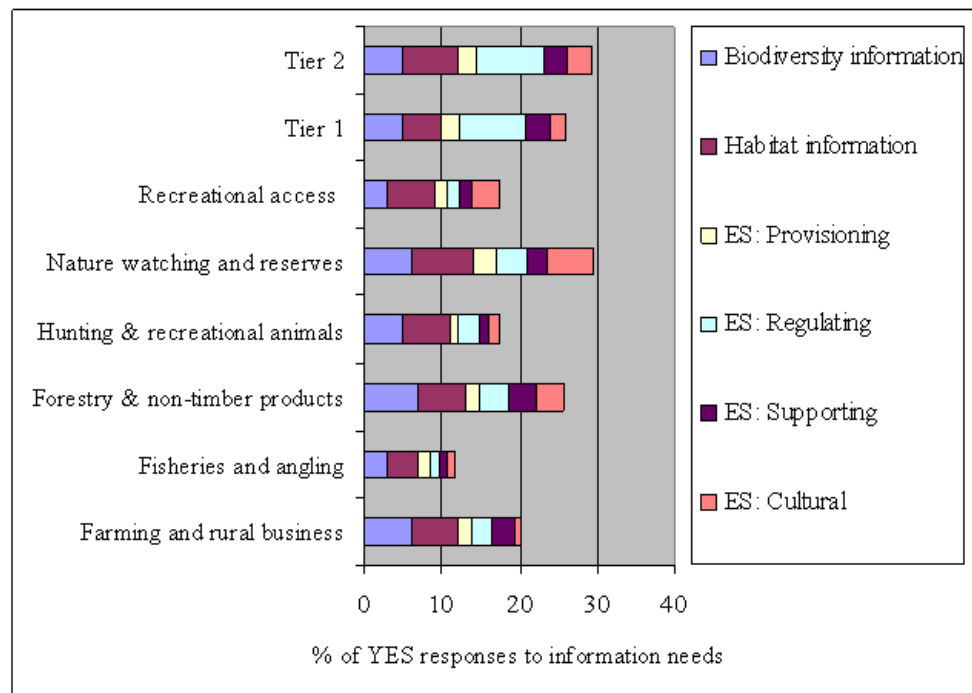


Figure 3. The types of environmental information needed by the different categories of stakeholders and representatives of local government (Tiers 1 and 2), categorized by biodiversity information and ecosystem services (ES). The results are combined for all case studies.

The data types within each of the broad categories varied in the level of perceived requirement. There was a frequent requirement for nationally or internationally protected species and habitat data but less for locally protected species and pests (Tables 9 and 10). In terms of ecosystem services, commonly required information included that relating to water, wild meat and fish, and fibre (e.g. timber), disaster management (e.g. floods), and *capacity* for tourism and recreation. Less commonly required was information on wild plants and fungi, cultivated crops, soils and *impacts* of tourism and recreation (Table 9 and 10). This is consistent with the generally greater emphasis in decision-making on social and economic than environmental factors. Requirements across all data categories were higher in Tier 2 than in the most local level of government (Tier 1) (Table 10).

Table 9. Categories of information selected by interviewees as required for their environmental decision-making. All interviewees including government representatives and other stakeholders are combined. Econ. = Economically.

	Data types more frequently required > 5 positive responses	Data types less frequently required < 5 positive responses
Biodiversity information	Species data (any) Protected species data (any) Nationally designated species Internationally designated species Native invasive species Non-native invasive species Habitat maps (any) Locally designated habitats Regionally designated habitats Nationally designated habitats Internationally designated habitats	Locally designated species Regionally designated species Wild pest species (agricultural) Wild pest species (health) Wild pest species (other)
Ecosystem Services: Provisioning	Econ. exploited wild species (mammals/birds) Econ. exploited wild species (fisheries) Cultivated forest products (timber, fuels) Livestock Aquaculture Air quality Water availability Water quality (and pollution)	Econ. exploited wild species (plant food/medicine) Econ. exploited wild species (plant materials) Econ. exploited wild species (fungi) Econ. exploited wild species (other, please state) Cultivated food crops
Ecosystem Services: Regulating	Flood risk / protection Fire risk / protection Risk of disease (wildlife to people) Risk of disease (wildlife to domestic animals)	Soil fertility Soil quality Soil retention (erosion risk) Pollination Pest control (e.g. predators of crop pests) Carbon storage potential
Ecosystem Services: Cultural	Amenity areas (parks, paths, verges) Tourism capacity Recreational capacity	Access Impacts of tourism Impacts of recreation

Table 10. The percentage of each of the categories of interviewees stating that they required specific information types with all countries combined and information categories combined / sampled* for brevity. Shaded cells show highest requirements (>60%).

		Tier 1	Tier 2	Farming	Fishing	Forestry	Hunting	Nature watching	Access
Biodiversity information	Species data (any)	71	63	50	40	75	67	80	67
	Protected species data (any)	57	75	25	40	75	56	80	67
	Locally designated species	43	38	8	10	50	22	40	33
	Regionally designated species	29	38	8	10	38	22	30	33
	Nationally designated species	29	63	17	30	63	44	60	33
	Internationally designated species	43	75	25	30	50	56	70	33
	Wild pest species (all)**	43	38	25	30	50	33	20	33
	Invasive species**	29	38	33	30	63	44	50	22
	Habitat maps (any)	71	88	50	30	88	56	60	33
	Locally designated habitats	57	63	33	10	100	44	50	33
	Regionally designated habitats	57	63	25	0	63	33	40	22
	Nationally designated habitats	43	75	17	10	63	33	70	33
	Internationally designated habitats	29	75	25	20	50	44	70	22
Ecosystem Services: Cultural *	Amenity areas (parks, paths, verges)	86	50	0	10	50	22	60	44
	Tourism capacity	86	63	0	10	63	11	70	44
	Recreational capacity	71	75	8	20	38	11	60	44
Ecosystem Services: Provisioning*	Economically exploited wild species (all)**	57	38	25	50	63	67	60	33
	Cultivated crops/ forest products **	29	38	33	10	88	33	30	11
	Livestock/Aquaculture **	71	63	25	20	25	11	30	11
Ecosystem Services: Regulating*	Flood risk / protection	100	63	25	30	50	22	70	33
	Fire risk / protection	86	75	42	20	100	44	60	33
	Risk of disease from wildlife to people	71	50	8	10	50	44	40	22
Ecosystem Services: Supporting*	Soil quality	57	63	42	0	75	22	30	22
	Soil retention (erosion risk)	57	63	25	0	75	22	20	22
	Water	71	38	8	30	38	0	40	33

** Maximum % values are cited for the group of categories (e.g. maximum of 2 categories for cultivated crops and forest products)

The determinants of Information Needs

The survey was designed to investigate the determinants or ‘drivers’ behind the information needs identified by the interviewees. For instance, local governments may have a requirement for information to inform EIA or SEA or land use planning (LUP) decisions.

The need for environmental information may be driven by a number of factors e.g.

- to comply with policy requirements
- land management
- nature conservation
- control of wild species / habitats e.g. agricultural pests or scrub encroachment

There was little difference between the groups of interviewees in their perception of the determinant of information requirements. It was interesting that all groups appeared to feel that statutory requirements and local policy requirements were important reasons behind their need for information. It may be that redesigning the survey could refine this result. Some interviewees may have given answers reflecting their perception of the reasons that would *in theory* influence data requirements without reflecting on the actual drivers behind their information needs *in practice*. Only just over 50% of the interviewees felt that nature conservation needs determined their information requirements.

Information requirement for EIA

The survey also considered to what extent local governments perceived a need for information to inform EIA. For each of the data categories (biodiversity and ecosystem services), interviewees were asked to consider whether the data they required was *also* needed for EIA. Notably, a relatively small proportion of the total required data were also required for EIA. Overall, only 23% of the required data were also required for EIA (Figure 4).

Biodiversity (species and habitat data) and provisioning ecosystem services data were required by many countries for EIA – however, even for these categories, more than half of the case studies responded that they were not required for EIA. Data that fell within the remaining three broad categories of ecosystem services (regulating, supporting, cultural) were rarely perceived as required for EIA (Figure 4). The low perceived need for data for this purpose is clearly related to the low degree of involvement in EIA and SEA in the Tier 1 governments. A large proportion of Tier 2 government interviewees, however, expressed a responsibility for EIA. It is therefore more surprising that many appeared to have a lower need for information for this purpose. This may be a function of interpretation. Interviewees may have assumed that they did not require the data because consultants perform the survey as assessment work. Further work would need to ensure clarification of this point to capture information needs even when these are mediated through consultants. However, administrations clearly felt a much greater need for environmental information for other purposes than for EIA.

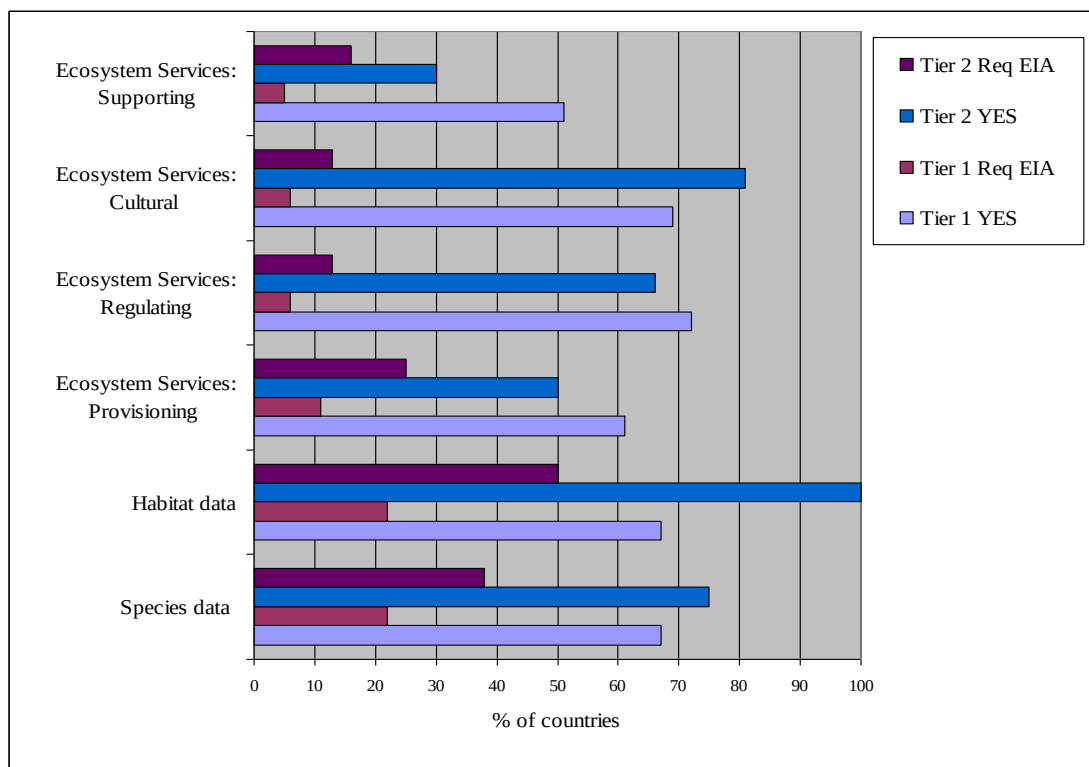


Figure 4. Data categories that interviewees gave as required for any purpose (YES) and that were felt to be necessary for Environmental Impact Assessment (Req EIA).

Information Sources used for Environmental Decision-making

The information sources used for addressing the environmental issues identified in section Environmental decision-making at the local level were categorised into sources of environmental data in order to investigate where the decision-makers were acquiring the necessary information. The main source of information for both tiers of government came from records held within the local governments themselves, closely followed by legislation and information held at the national and regional level of government. Local knowledge was used more in Tier 1 than Tier 2, who relied more upon private consultants and advisors. Government agencies and NGOs were used more by the Tier 1 administrations (see also Chapter 4).

When comparing the use of different data sources by government representatives and individual stakeholders, it is not surprising to find that the largest proportion of respondents used the Internet to source species and other environmental data. All stakeholder categories, except Tier 1, kept their own records of species and other environmental data, ranging from 10% of respondents in the “farming and rural business” category to 100% in the “hunting and recreational animals” category.

Investigation of the characteristics of the information used in local government (Tier 1 and 2) revealed that a substantial proportion of the data used was not available in a digital format and was not regularly updated. For example, only 69% of environmental data used by Tier 1 was stored on a computer and only 63% was regularly updated. Only 23% of data used by Tier 1 and 29% of data used by Tier 2 was considered by the interviewees to be spatially referenced. Comparison between countries of local level government reveals similar patterns.

The degree of availability of data in digital format or spatially referenced varied considerably between countries, and spatial referencing was particularly lacking in many countries. The case studies with highest proportion of data available in regularly updated digital format to

their Tier 1 governments were Turkey (Firtina) and Portugal. Romania, Turkey Egidir and Greece reported the same for their Tier 2 government.

Although this may identify a need for data to be more accessible and available in a more user-friendly format, care should be taken in the interpretation of these results as the response rate was poor, with between many between 11% and 38% of non-responses to the questions on the accessibility of data in the interviews.

Availability of Required Data

The survey asked interviewees whether they were able to obtain the environmental information that they needed. A substantial proportion of responses for both tiers of local government and for the individual stakeholders indicated that either “most” or “all of the required data was available. However, up to 15% of respondents indicated that “none” of the required information was available, highlighting a major obstacle to effective decision-making.

To investigate differences in accessibility for different types of information, the responses for all groups of stakeholders were grouped using a Data Acquisition Index (DA_q), which applied a ‘weight’ to each response depending on the degree of availability. Percentage, rather than sum of responses was used to avoid positive bias to those categories that were simply required more regardless of relative availability.

$$DAq_i = \% \text{ responses} \times \text{weight}_i$$

Where weight: None = 0, Some = 1, Most = 2, All = 3

When all responses were grouped, the DA_q Index revealed that local & regional biodiversity data was particularly lacking, whereas national and international data was the most easily acquired. Interestingly, information on the four broad categories of ecosystem services was perceived to be more readily available than local biodiversity data.

There was some variation between countries, and stakeholder groups, in terms of the degree to which needs were met. Romania and the UK (except Tier 2) indicated that they were able to acquire a relatively high proportion of information required, whereas both tiers of local government in Estonia indicated relatively low acquisition. Interestingly the individual stakeholders in Estonia expressed very different views – showing a much higher satisfaction with information access. It is important to note that perception of the completeness of information to aid decision-making will depend on the demand for these data as well as their supply. Interviewees will have considerable differences in their concepts of the appropriate information needed to make an informed decision affecting their environment.

Barriers that Impede Access to Adequate Environmental Information

All categories of stakeholders and both levels of local government encountered barriers that impeded access to adequate environmental information. Notably the groups with the greatest perceived *need* for environmental information (local government and nature watching and reserves) also reported the greatest difficulty with obtaining the data that they required. This suggests that there may be a motivational effect with barriers only being encountered when effort is made to acquire the information. Forester interviewees reported the least difficulty obtaining data, perhaps reflecting the availability of certain types of information. This aspect would merit further clarification in future work.

Differences in the degrees of difficulty in obtaining suitable information were evident between countries. Hungary, Poland and the UK indicated the highest number of problems when obtaining data, experiencing up to seven out of the nine potential issues identified for both tiers of local government and 100% of the individual stakeholders in Greece and Poland encountered some barriers.

In contrast, none of the Romanian local government, or other stakeholder interviewees except for the representative of the “hunting & recreational animals” category, reported any impediments to information access; the Romanian category was an exception to this pattern. On average across countries, 52% of the individual stakeholders’ encountered barriers to prevent access to information.

Difficulty in ‘finding the information’ was the category most commonly selected as the reason for difficulty in acquiring adequate information. However, each factor identified in the survey design as a potential barrier was encountered by most of the stakeholder groups, with accuracy, scale, access & age identified as the most important barriers. The factor that considered motivation of the interviewee, ‘not likely to make a difference’ was the least commonly selected (Figure 5). This suggests that there is an enthusiasm as well as a need for adequate information, which is currently thwarted, to some extent, by a number of barriers to acquisition, with difficulty in locating the information presenting the most frequent impediment.

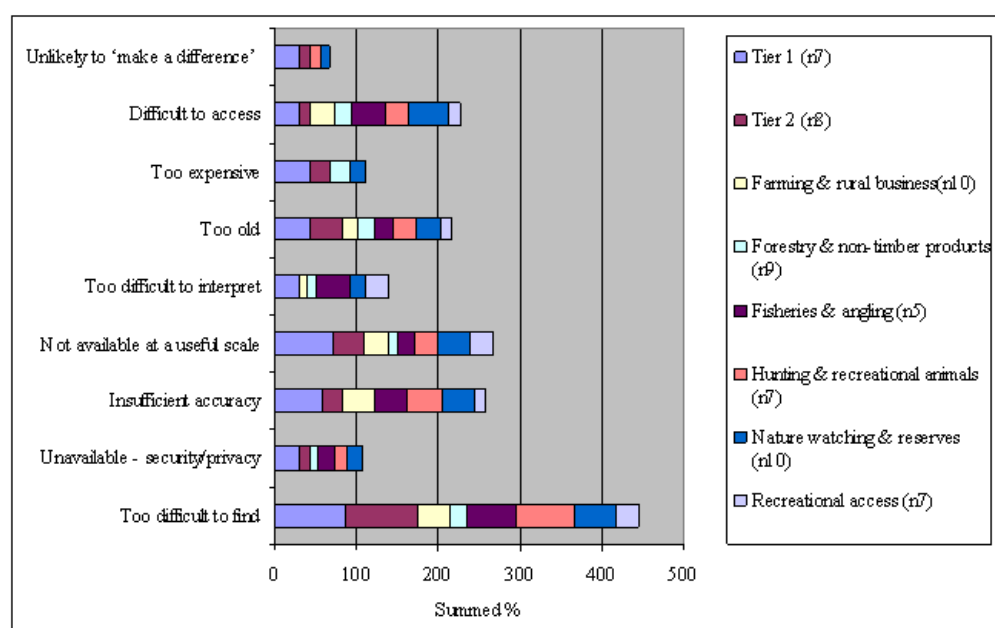


Figure 5. The proportion of interviewees for each stakeholder category and the proportion of government representatives in each partner country who indicated a factor that caused problems when obtaining data.

CONCLUSIONS AND RECOMMENDATIONS

The aims were condensed into five questions regarding the supply and demand of environmental information to local governments and selected groups of individual stakeholders.

These were:

- What are the information needs?
- What determines the information needs?
- What information is used?
- What information is needed but currently unobtainable?
- What are the barriers to obtaining information?

What are the Information Needs?

The survey found that all groups of interviewees spent a substantial proportion of time considering environmental matters when making management decisions although the greatest needs for environmental information were in government, nature-watching/reserve

management and forestry. The demand for environmental information varied between the groups of interviewees but almost all categories of information that were surveyed (biodiversity and ecosystem services) were required, to some degree, by all categories of stakeholder. Notably, information on heritage conservation was an exception. Information on physical hazards such as flood and fire risk, biodiversity and tourism capacity were key issues for local governments across the case studies. In particular, Tier 1 tended to put more priority and need more information on ecosystem services and socio-economic considerations generally than Tier 2, which was in turn more focussed on biodiversity issues than Tier 1.

What Determines the Information Needs

All of the possible ‘drivers’ that might determine information needs that were identified in the survey were rated as important factors by the interviewees from all sectors. These included a statutory requirement to inform management decisions, a need for information for local policy formulation and a need to inform management decisions. Despite recognition of the importance of statutory requirements in driving information needs; local government interviewees tended to report a fairly low level of direct involvement in EIA and, especially SEA processes. This was particularly notable in the most local level of government (Tier 1). Nevertheless, the relatively low requirement reported for specific data types to inform EIA that was reported by Tier 2 as well as Tier 1 is a little surprising.

The number of decisions being made might also drive information needs. When viewed in terms of the area managed, it was evident that the individual stakeholders in the farming and rural business category reported more decisions annually than the other categories. Further work in this area would be required for more robust interpretation that allows comparability between decisions. In other words a decision to trim 50m of hedge by a one farmer is not equivalent to a decision to trim all the hedges in a large estate by another farmer, or indeed, a decision by a local government department to grant planning permission for a major development. If this approach is to be used in future surveys, the ‘decisions’ need clear and specific definition. For this reason, data on areas affected by decisions were tightened for the Pan-European survey in Chapter 6.

The extent of involvement in the decision making process may also influence perceived needs. The survey indicated a disparity in the perception of the participatory process between local government and individual stakeholders. The stakeholders generally felt that they had little involvement and influence, whereas the local government responses reflected a perception that the mechanisms for engagement with local communities were in place. If individuals do find it difficult to engage with local environmental decision-making processes, this perceived disenfranchisement is likely to reduce their demand for information.

What Information is Used?

A reliance on Internet sources of information was reported across all government & other stakeholder categories and in all of the case studies. In contrast, there was a limited use of local survey data and especially of information derived from scientific survey. This raises the question of the quality and validity of information that may be being used to make decisions affecting environmental management right across the sample of case studies.

It was apparent that much of the information accessed by local governments was not stored on computers; even less was regularly updated or spatially referenced (i.e. mapped). Another point of interest, and importance for design of information systems, was that although most information was needed by government, forestry and nature-watching/reserves, four of the stakeholder groups (especially hunting and nature-watching/reserve-management) were at least as active as Tier 2 governments in generating their own environmental information, as demonstrated by the proportion of their information requirements that were met through their own survey and record keeping.

What Information is needed but Currently Unobtainable?

A substantial proportion of interviewees reported difficulties in obtaining adequate information for their decision-making purposes. This response was found in all government and other stakeholder groups, and across all case studies. Although biodiversity information at the National level (e.g. national figures for biodiversity and habitat) was relatively accessible, species and habitat data collated at the local & regional level appeared to be the most difficult category of information for interviewees to access.

Notably, the highest perception of these impediments to data access occurred in the stakeholder groups (local government & nature watching and reserves) that also indicated that greatest requirements for information, although foresters seemed to have adequate access. Perhaps the motivation of interviewees affected the likely perception of barriers. In other words, stakeholders who expressed little need for information were unlikely to encounter barriers to obtaining data.

What are the Barriers to Obtaining Information?

Many potential barriers to obtaining adequate information were reported in the surveys and this occurred in all of the case study countries and all of the stakeholder groups. The most frequently cited problem was a difficulty in finding & accessing information. Other key issues encountered by the interviewees were the accuracy of the data, availability at an appropriate spatial scale, and the age of data.

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