

BioFresh online survey on the profile of freshwater biodiversity in policy-making

Evaluation Report

Ecologic Institute (Gerardo Anzaldua, Eleftheria Kampa, Isabelle Turcotte)

Oxford University School for Geography and the Environment (Rob St. John, Paul Jepson)



December 2011

Executive Summary

This report presents the results of an online survey on stakeholder perception of the freshwater biodiversity profile in policy-making, which was carried out in summer 2011 within the scope of the European Union FP7 project BioFresh. The survey aimed to explore stakeholders' attitudes towards freshwater biodiversity by assessing:

- The status and profile of freshwater biodiversity as a policy issue;
- The potential synergies between freshwater biodiversity and other areas of policy;
- The relevance of policy-orientated science questions generated by the BioFresh project;
- The effectiveness of different channels of communication between scientific and policy communities.

The population of respondents to the survey consisted of 52 stakeholders from different sectors/policy areas who have been active mainly in the water and biodiversity areas in the past years. The highest number of respondents came from national government agencies (15), international NGOs (8) and universities/research institutes (7).

Some of the main insights gathered were:

Perceptions of policy relevance of freshwater biodiversity

- The survey results suggest that **freshwater biodiversity is not yet a well established policy issue**. 48% of respondents to this survey view freshwater biodiversity as a *recognised policy issue but given little attention*. This suggests that work needs to be done, also via scientific projects like BioFresh, on finding means to turn political recognition of the issues into positive action.
- The survey results indicate that the most promising ways to **raise the policy profile of freshwater biodiversity** are related to the provision of evidence on the value of freshwater biodiversity (especially by recognition and demonstration of **ecosystem services**), **perception-based work** targeting the policy communities and the general public as well as better **integration of freshwater biodiversity in the implementation of other policies**.

For the latter, the most promising chances are given by the implementation of the EU Water Framework Directive, agri-environmental policies and biodiversity (conservation) policies as well as further work towards policy and inter-sectoral integration between water, biodiversity and agricultural objectives.

Relevance of policy-orientated science questions of BioFresh

- Certain policy-orientated science questions generated by the BioFresh consortium were highlighted by survey respondents as **highly policy-relevant**. These questions encompassed the **linking of ecosystem function and ecosystem services, multi-scale conservation planning** and freshwater biodiversity and ecosystem **response to climate change**.

All these topics are key tenets of BioFresh, which gives positive reinforcement to the aims and potential outcomes of the project. This outcome also indicates that the main policy-orientated dissemination efforts of the BioFresh project should concentrate on

the identification of appropriate communication channels to inform stakeholders about project results on these topics, most relevant to their policy work.

- The BioFresh consortium also put forward policy-orientated science questions, which were rated by survey respondents as of **limited/less policy-relevance**. These questions encompassed the formation and consequences of **novel freshwater ecosystems**, the value of **eco-informatics** and the framing and **perception of freshwater biodiversity**.

These topics are important to the scientific community of freshwater conservation. Yet especially the issues of novel ecosystems and eco-informatics could be argued to be relatively new concepts for the policy communities keeping abreast of academic debates in ecology and conservation management. It is considered that awareness-raising efforts in an appropriate format on both topics remain important because of their potential value to policy decisions.

Channels of communication between science and policy

- Traditional formats of communication between science and policy communities, in particular **face-to-face briefings, policy briefs, and conferences/workshops**, are generally seen as the **most effective**.
- The survey outcomes suggest that **efforts to disseminate scientific information** to policy-relevant communities should concentrate on communication channels which have been considered by several as effective (face-to-face briefings, policy briefs, conferences/workshops, newspaper/magazine articles), with specific emphasis on those not as frequently used yet (perhaps because not frequently available or easily accessible), such as face to face briefings, policy briefs and newspaper/magazine articles.
- **Further work on the value of new media**, especially blog posts and YouTube style videos, as communication channels of scientific information to policy makers is also recommended.

Table of Contents

- 1 Introduction..... 1**
- 2 Perceptions of policy relevance of freshwater biodiversity 5**
 - 2.1 Status and profile of freshwater biodiversity in policy-making..... 5**
 - 2.2 Opportunities and barriers for the policy profile of freshwater biodiversity 6**
- 3 Relevance of policy-orientated science questions 11**
- 4 Channels of communication between science and policy 13**
- 5 Key messages..... 18**
 - Annex A. Survey questionnaire 21**
 - Annex B. Survey invitation email..... 26**
 - Annex C. Full responses on key opportunities and barriers for policy profile of freshwater biodiversity 27**
 - Annex D. Additional policy-orientated questions raised by survey respondents 31**

I Introduction

This report presents the results of an online survey on stakeholder perception of the freshwater biodiversity profile in policy-making, which was carried out in summer 2011. The survey was conducted with the overarching aim of exploring stakeholders' attitudes towards freshwater biodiversity and it focuses on:

- The status and profile of freshwater biodiversity as a policy issue;
- The potential synergies between freshwater biodiversity and other areas of policy;
- The relevance of policy-orientated science questions generated by the BioFresh project;
- The effectiveness of different channels of communication between scientific and policy communities.

This work was performed within the scope of the European Union FP7 project BioFresh (freshwaterbiodiversity.eu). The BioFresh project is building an integrated and publicly available data portal to provide a better access to the existing vast amount of information on freshwater biodiversity scattered in various databases. This global portal on the distribution, status and trends of freshwater biodiversity will support the science, policy and conservation of freshwater ecosystems.

In addition to the survey objectives stated above, the survey also aimed at raising awareness about the policy-relevant work of the scientific consortium of BioFresh and at improving the dissemination of scientific results to relevant policy communities.

Towards this goal, a survey was conducted by Ecologic Institute between June and August 2011 using the online survey tool LimeSurvey, to gain insight on the 4 issues of focus mentioned above. The survey questionnaire consists of 10 questions, mostly multiple choice / closed-ended and a few open-ended questions (the questionnaire is available in Annex A).

A total of 224 stakeholders received a personal invitation to participate in the survey. Individuals were profiled against their involvement with biodiversity and water policy topics, characteristics which were identified through their affiliations and/or active partaking in related events (i.e. international forums, workshops, conferences). Each one was sent an email with details and a link to the survey (see invitation email in Annex B).

Stakeholders invited to participate in the survey were mainly based in Europe, with few exceptions of stakeholders active on an international/global level. For this reason, the outcomes of this survey are mainly relevant for the European level.

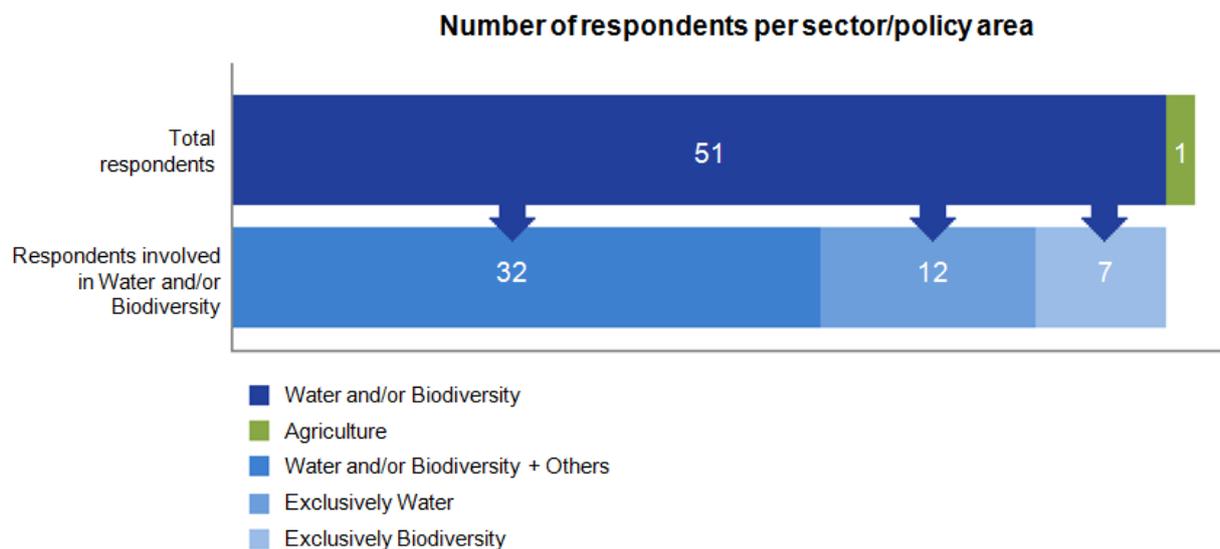
Survey respondents

Out of the 224 persons contacted, a total of 52 individuals agreed to participate in the survey, for a response rate of 23%. This group of respondents included experts from different sectors/policy areas who have been active, to different extents, in the water and biodiversity areas in the past years. An initial characterisation of the respondent group results from examining the responses to Question 1a – “*Which sector(s)/policy area(s) have you been actively working on in the last year?*” Based on their area of activity in the last year, the

sample of 52 respondents can be divided into three main categories and one outlier (see Figure 1):

- Those working exclusively in the biodiversity sector/policy area (7 respondents / 13%);
- Those working exclusively in the water sector/policy area (12 respondents / 23%); and
- Those involved in both sectors/policy areas together and/or in combination with other sectors (32 respondents / 62%) like climate change and energy (17 respondents), agriculture, fisheries and forestry (20 respondents), health, tourism, transport and urban planning (11 respondents).
- One respondent working exclusively in the agricultural sector/policy area (2%).

Figure 1 Sector/policy area the respondent has been actively working on in the last year (sector and number of respondents)



Responses to Question 1b – “Which sector(s)/policy area(s) have you been actively working on in the last 5 years?” confirm to a large extent the respondent classification discussed above. 38 of the 52 respondents made no changes to the sectors/policy areas they have been actively working on in the last five years.

As in any survey of this nature, there is likely to be an element of subjectivity in the responses, which could influence the category of work the respondents placed themselves in. Despite this, the classification gives a useful qualitative representation of the respondents' backgrounds.

Answers to Question 2 “Which of the following best describes your organisation?” allow for further characterisation of the respondent group. For instance, the highest number of respondents comes from national government agencies (15), international NGOs (8) and universities/research institutes (7) (see Table 1). Some respondents who have described their organisation as pertaining to more than one of the types proposed in the questionnaire are listed in the end of Table 1.

Table 1 Types of organisations in which survey respondents work

Type of organisation	No. of respondents	%
National government agency	15	29
International NGO	8	15
University/research institute	7	13
Intergovernmental organisation	5	9
Regional/local government agency	4	8
European institution	3	6
Industry/trade association	3	6
Consultancy	1	2
National NGO	1	2
Consultancy + university	2	4
Industry/trade association + NGO	1	2
Industry/trade association + international NGO + university	1	2
University/research institute + national government agency	1	2
Total	52	100

The survey responses are, for most questions, analysed for the entire population of respondents. Where considered relevant for taking the analysis further, the population of respondents has been divided into five clusters of organisations. Please note that the answers of those respondents who described their organisation as belonging to more than one type could not be classified into a single cluster. In these cases, the score of their responses was broken into decimals which were allocated in equal proportions to each of the clusters under which they were respectively classified. The five organisation clusters are as follows:

- European institutions and government agencies (national/regional/local) (22.5 respondents);
- Universities/research institutes and consultancies (11.2 respondents);
- National and international NGOs (9.6 respondents);
- Intergovernmental organisations (5 respondents); and
- Industry associations (3.7 respondents).

This grouping often reveals differences in perception amongst the various types of actors involved, at different levels, in freshwater biodiversity. However, this approach is limited in its ability to uncover substantial or representative differences between clusters given the small size of the respondent population. Furthermore, some groups (especially intergovernmental organisations and industry associations) are not represented optimally due to the lesser number of respondents.

As such, the authors have no pretence of providing any inductive arguments for generalising the positions of the respondents. Nonetheless, they also recognise the potential insights that the provided answers can offer and aim to employ these to outline the policy relevance of freshwater biodiversity.

Responses were retrieved from the online survey tool LimeSurvey. Their statistical analysis was conducted using MS Excel.

2 Perceptions of policy relevance of freshwater biodiversity

The following section discusses the answers collected for survey questions 3, 4 and 5. The first two are close-ended questions which sought to appraise the policy relevance of freshwater biodiversity according to experts working in the field, or adjacent fields. As a follow up question, question 5 sought to identify potential avenues for increasing the policy profile of freshwater biodiversity.

2.1 Status and profile of freshwater biodiversity in policy-making

Respondents were asked to rate the current status of **biodiversity as a policy issue** (not limited to freshwater biodiversity) and the prominence of **freshwater biodiversity as a policy issue** (see results in Table 2). The analysis of the responses received suggests that biodiversity is generally better established as a policy issue than freshwater biodiversity. 31% of respondents consider that **biodiversity** is an *established & active policy issue*, while 41% think of it as a *recognised policy issue which is increasing in importance*.

When it comes to **freshwater biodiversity**, 48% of all respondents consider it as a *recognised policy issue but given little attention so far*. Notably, respondents from NGOs (7 out of 10 NGO respondents) rated freshwater biodiversity as an issue which is '*recognised but given little attention*'. Only 17% of all respondents identify freshwater biodiversity as an *established aspect of biodiversity policy* and another 17% see it as *recognised and with clear actions to establish*.

Table 2 Perception of the status and profile of biodiversity and freshwater biodiversity in policymaking

Status of biodiversity (Q3)	No. of respondents	%	Prominence of freshwater biodiversity (Q4)	No. of respondents	%
Established and active	16	31	Established aspect of biodiversity policy	9	17
Established but declining in importance	7	14	Recognised, with clear actions to establish	9	17
Recognised and increasing in importance	21	40	Recognised, but given little attention	25	48
Not an active policy issue	5	9	Limited or no profile	6	12
I am not aware	1	2	I am not aware	1	2
N/A	2	4	N/A	2	4

Q3. In your policy-related work, how would you describe the current status of biodiversity as a policy issue? (not limited to freshwater biodiversity)

- Q4. Based on your level of involvement with biodiversity policy, how would you rate the prominence of freshwater biodiversity as a policy issue?
Base: 52 respondents.

2.2 Opportunities and barriers for the policy profile of freshwater biodiversity

Respondents were asked to identify key opportunities and barriers for freshwater biodiversity to achieve greater policy profile. The responses collected for this open-end question (full responses available in Annex C) are qualitative and differ between stakeholders.

To allow for statistical analysis, answers were coded and classified into the following ten categories: *Perception/framing of freshwater biodiversity; ecosystem services/water as a resource; knowledge/research; climate and energy debate; Water Framework Directive (WFD); Policy sectoral links and integration; financing and resources; ecosystem approach; EU legislation (not restricted to the WFD); other.*

The aggregated results on this question as well as examples of answers collected for each opportunity/barrier category are shown in Table 3.

The main sources of **opportunities** reported to achieve greater policy profile for freshwater biodiversity were relevant to:

- Ecosystem services/water as a resource (12 respondents)
- The perception/framing of freshwater biodiversity (12 respondents)
- The EU Water Framework Directive (WFD) (9 respondents)
- EU legislation (not restricted to the WFD), especially related to agri-environmental policies in the reformed CAP and to nature protection Directives (Birds and Habitats Directives) (10 respondents)
- Policy/sectoral links and integration, such as aligning water and biodiversity environmental objectives and greater links between biodiversity policy and water/agricultural policy (8 respondents).

The most frequently reported **barriers** to achieving greater policy profile for freshwater biodiversity pertain to:

- The perception/framing of freshwater biodiversity (17 respondents)
- Knowledge/research (11 respondents)
- Financing and resources (10 respondents).

The **ecosystem services** paradigm is seen as a potent one to improve our understanding of how the freshwater environment enhances our livelihoods and thus useful as a vehicle to raise the policy profile of freshwater biodiversity. The recognition and demonstration of ecosystems services could help solve the often conflicting perspectives of freshwater conservation and water resources development towards a more holistic approach, seeking synergies between environmental and economic objectives.

Additionally, survey results point out that respondents generally support the strategic policy orientation underlying **EU environmental legislation**. The EU WFD is positively perceived as providing an effective framework to protect freshwater biodiversity via its objective to achieve good ecological status of European waters. Key chances to raise the policy profile of freshwater biodiversity also arise from the implementation of other policies, especially the EU Birds and Habitats Directives and the use of targeted agri-environmental schemes in the context of the Common Agricultural Policy (CAP) reform.

Additional opportunities to enhance the position of freshwater conservation on the policy agenda exist in efforts to align water, biodiversity and agricultural policy objectives. The issue of (still lacking) policy and intersectoral integration is equally seen by survey respondents as a current barrier to the establishment of freshwater conservation as a policy issue. Respondents pointed to the fact that water and biodiversity remain distinct policy communities and relevant policy regulations have different time frames.

Interestingly, the largest number of both opportunities and barriers relate to the issue of **perception and framing** of freshwater biodiversity (e.g. public and decision maker perception). This is not surprising, as a limited or poor perception of the issues is suggested to be a barrier to greater policy profile, but changing this perception positively presents opportunities. Consistently, **knowledge and research** ranks as the second most important barrier. Increasing research and disseminating knowledge can raise awareness and enhance the public opinion, in turn prompting political action. As it is often the case, increasing research and dissemination will be contingent on the financial resources made available towards this goal. This limitation was also identified by respondents who, overall, regard **financing and resources** as the third most important barrier.

From a synthesis of the respondents' opinions on the issues that constitute main opportunities and barriers for raising the policy profile of freshwater biodiversity, it is here argued that **adopting an approach which integrates the concepts of ecosystem services to increase public and political awareness and which is structurally and financially supported by cross-sectoral legislation is a most promising avenue for increasing the policy profile of freshwater biodiversity.**

Table 3 Opportunities and barriers for the policy profile of freshwater biodiversity

	Opportunities			Barriers		
Category	#	%	Examples of responses received	#	%	Examples of responses received
Issue perception/ framing	12	15.4	<ul style="list-style-type: none"> - Public and institutional awareness of loss of biodiversity - Political attention 	17	22.4	<ul style="list-style-type: none"> - In times of economic problems environmental aspects are losing awareness in public opinion/policy makers and rapidly overruled - No awareness on aquatic communities except fish - Biodiversity is still very low in political agendas
EU legislation (not restricted to WFD)	10	12.8	<ul style="list-style-type: none"> - CAP reform/increasing water scarcity - Use of targeted agri-environment schemes can be a effective tool and needs further exploring - Better implementation of relevant EU directives (WFD, habitats, birds) 	3	3.9	<ul style="list-style-type: none"> - Control of livestock (aside from decoupled payments) is a voluntary option- i.e. agri-environment
Ecosystem approach	3	3.8	<ul style="list-style-type: none"> - Shift attention to ecosystem functioning - Ecosystem health 	4	5.2	<ul style="list-style-type: none"> - Focus on water rather than species/habitats - Too high emphasis on ecosystem structure versus function
Financing and resources	1	1.2	<ul style="list-style-type: none"> - Resource constraints, private sector engagement 	10	13.2	<ul style="list-style-type: none"> - Very costly measures to improve ecological status - Few resources due to other responsibilities by law, low pressure to act on biodiversity - Economic crisis
Policy/sectoral links and integration	8	10.3	<ul style="list-style-type: none"> - Greater links to water/agriculture policy - Aligning water and biodiversity environmental objectives 	7	9.2	<ul style="list-style-type: none"> - Water and biodiversity communities are different - Different time frames of both regulations - Poor collaboration between responsible government departments
Water Framework Directive	9	11.5	<ul style="list-style-type: none"> - FWB is part of the goals set by the WFD - Ecological status of water bodies 	1	1.3	<ul style="list-style-type: none"> - (No specific answers)
Climate and energy debate	5	6.4	<ul style="list-style-type: none"> - Climate change adaptation - Climate change mitigation can benefit water 	6	7.9	<ul style="list-style-type: none"> - Increase of energy generation by renewable sources (hydropower in particular) also increases the threat for FWB

Knowledge / research	5	6.4	<ul style="list-style-type: none"> - New generation of professionals - Long term monitoring - New research infrastructure and innovative tools 	11	14.5	<ul style="list-style-type: none"> - Business as usual mitigation response - Coordination between database/Scattered information/lack of data - Little knowledge in aquatic flora - Failing to establish scientifically robust water quality standards necessary to support biodiversity objectives
	Ecosystem services / water as a resource	12	15.4	<ul style="list-style-type: none"> - Recognition of ecosystem services - Demonstration of value for the public - Many recreational users 	6	7.9
Other	13	16.8	<ul style="list-style-type: none"> - International projects - Involvement in IPBES/CBD - Improving understanding and engaging with land managers 	11	14.5	<ul style="list-style-type: none"> - Complexity of science-policy/transdisciplinarity - Industry pressure on government not to act - Broad spatial scales of issues that need to be addressed

Q5. : In terms of achieving greater policy profile, what do you see as the key opportunities and barriers for freshwater biodiversity? Please state two for each.

Base: number of responses received pertaining to a certain category divided by the total number of responses (a total number of 78 opportunities and 76 barriers were received)

Responses by groups of organisations

The survey responses also indicate that perceptions of opportunities and barriers to increasing the policy profile of freshwater biodiversity vary across key groups of organisations of the respondent population. Figure 2 indicates how the five key groups of organisations identify different key opportunities and barriers.

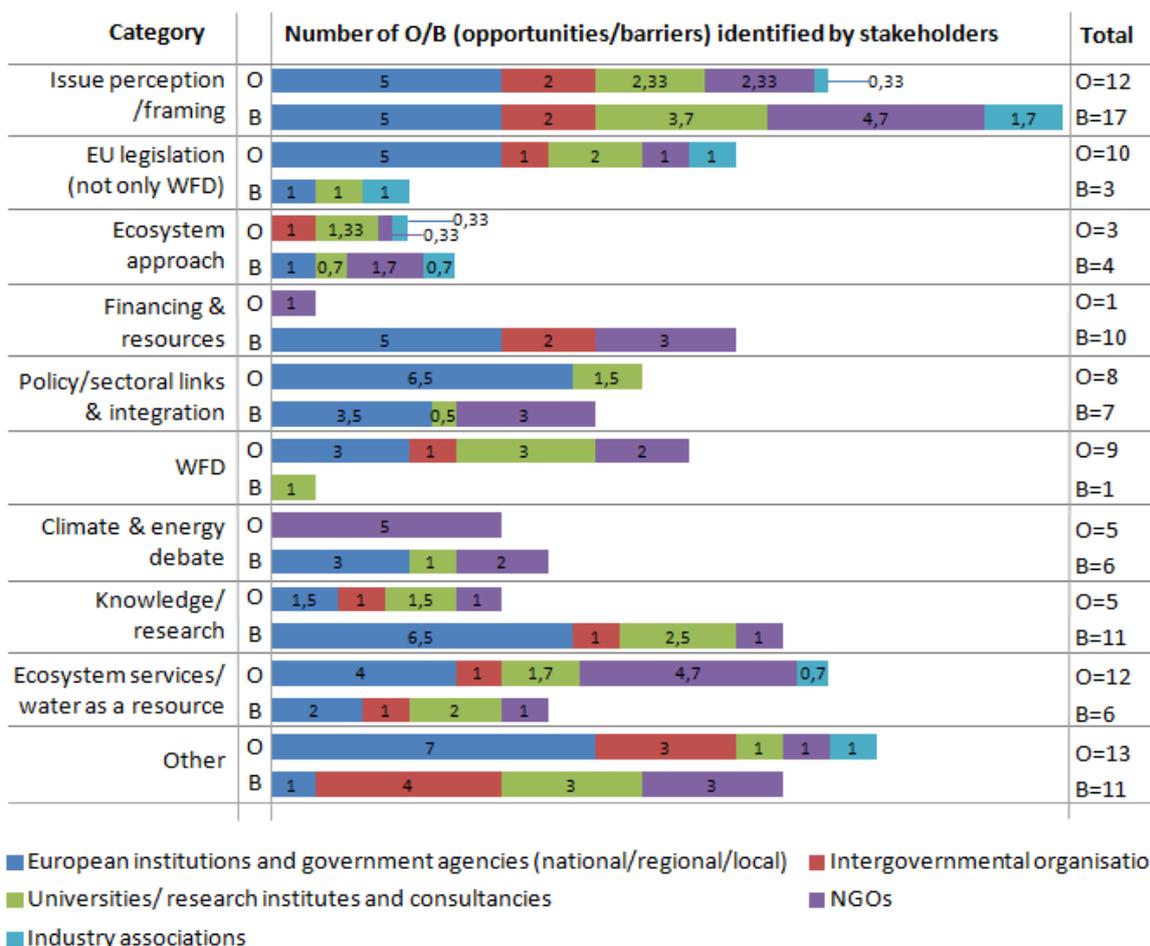
European institutions and government agencies identified issues falling under **policy/sectoral links and integration** and **knowledge and research** as the top opportunities and barriers respectively.

Universities/research institutes and consultancies mainly identified issues relevant to the **perception/framing** of freshwater biodiversity as key barriers to raising the policy profile.

NGOs ranked **climate/energy debate** and **ecosystem services/water as a resource** as the key opportunities.

However, as mentioned in section 1, since the groups of organisations fail to sufficiently represent the entire population, it would be a faulty generalisation to assume these opinions to be true across all members of the same group.

Figure 2 Opportunities and barriers for the policy profile of freshwater biodiversity (breakdown by stakeholder group)



Q5. : In terms of achieving greater policy profile, what do you see as the key opportunities and barriers for freshwater biodiversity? Please state two for each.
Base: 78 opportunities and 76 barriers received

3 Relevance of policy-orientated science questions

In Question 6 of the survey, respondents were asked to rate their perception of the policy relevance of ten *key questions* relating to freshwater biodiversity which had been identified at an earlier stage by the BioFresh project consortium. The key questions were rated by participants as highly, moderately, limited, or not relevant for policy.

Figure 3 shows the number of respondents rating each of the ten questions under each rating category (4 to 0), and their average rating.

Figure 3 Perception of relevance of 10 key policy-orientated science questions

Question		# of respondents per rating					Average rating
		4	3	2	1	0	
Q3	What is the link between freshwater biodiversity, ecosystem processes and ecosystem services?	42	6	0	0	0	3.9
Q4	How do we quantify, map and value freshwater-related ecosystem services?	33	13	2	0	0	3.7
Q10	How do we incorporate freshwater conservation planning into integrated catchment and water management?	35	8	4	0	1	3.6
Q1	How will freshwater biodiversity and ecosystems respond to climate change?	28	18	1	0	1	3.5
Q8	What are the mechanisms and effects of the spreading of invasive species and how can these be mitigated?	22	22	4	0	0	3.4
Q6	Can we establish thresholds to balance extractive use with the maintenance of freshwater biodiversity and ecosystem services?	24	13	7	1	3	3.1
Q2	What is the value of eco-informatics (biodiversity data portals) to policy and policy makers?	13	18	14	2	1	2.8
Q9	How do different groups frame and perceive freshwater biodiversity issues and who influences the science-policy-public dialogue?	16	15	12	3	2	2.8
Q5	Does a focus on ecosystem services compromise efforts to conserve freshwater biodiversity?	9	22	9	5	3	2.6
Q7	How do novel freshwater communities form, is this a common phenomenon and what are their ecological and evolutionary consequences?	6	16	14	7	5	2.2

Graph based on the average grading of the policy questions by 48 respondents.

Ranking scale: 4= Highly relevant; 3=Moderately relevant;

2=Of limited relevance; 1=Not relevant; 0=No opinion

The *most policy-relevant science questions* generated by the BioFresh consortium, as identified by the survey respondents, were those which encompass:

- The linking of ecosystem function and ecosystem services (Q3, Q4).

This result ties in with the findings from the previous section 2.2, where the **ecosystem services** paradigm was perceived by respondents as an important tool to increase the policy profile of freshwater biodiversity.

- **Multi-scale conservation planning**, especially the integration of freshwater conservation with water and catchment management (Q10); and
- Freshwater biodiversity and ecosystem **response to climate change** (Q1).

All are key tenets of BioFresh, which gives positive reinforcement to the aims and potential outcomes of the project.

The science questions following in the policy-relevance ranking referred to the spreading of **invasive species** (Q8) and thresholds to **balance extractive water use with freshwater conservation** (Q6).

The *least policy relevant question* referred to the **formation of novel freshwater communities** (Q7). This suggests that respondents view this scientific question as being beyond (or at least somewhat distinct from) the realm of policy, putting forward the challenge of extracting and communicating policy relevant messages from science.

Novel ecosystem formation is an issue rising swiftly up the policy agenda, and one which is inextricable from climate change, ecosystem services and conservation management. Therefore, awareness-raising on the processes, implications and potential mitigation strategies with regards novel ecosystem formation is likely to remain necessary amongst key policy stakeholders.

The next question judged as least relevant (Q5) asked whether the **focus on ecosystem services compromises efforts to conserve freshwater biodiversity**. Combining the response rate for this question with the way respondents rated Q3 and Q4 (as highly relevant) shows that respondents (far from thinking that a focus on ecosystem services is detrimental to conservation) see a lot of potential to increase the policy profile of freshwater biodiversity via the ecosystem services paradigm.

The question referring to the **way that different groups frame and perceive freshwater biodiversity issues** (Q9) was not judged as highly relevant either. This may seem to contradict findings in the previous section 2.2, whereby most opportunities and barriers identified for achieving greater policy profile of freshwater biodiversity pertained to issue perception and framing.

In the view of the authors, this does not necessarily indicate a contradiction. Other policy-orientated questions, especially those referring to ecosystem services, may be perceived as a more tangible and comprehensible approach for policy makers. On the policy-making level, the question of perception and framing may not offer as implicit solutions to freshwater conservation as ecosystem services valuation. Nonetheless, understanding the framing and perception of biodiversity as a policy issue is likely to be crucial in supporting the participatory dialogue over the formation of policy through scientific evidence.

The question on the **value of eco-informatics to policy** (Q2) also ranked rather low in terms of its policy relevance, suggesting that respondents to this survey are not frequent users of biodiversity data portals. Nevertheless, raising awareness of what eco-informatics is and the value it provides to policy decisions is likely to remain important.

Additional policy-orientated questions raised by respondents

The survey also invited respondents to add further questions/issues relevant to policy that had not been raised by the BioFresh project consortium.

Several of the additional questions raised were relevant to ecosystem services, to policy implementation and coordination and to the perception and framing of freshwater biodiversity by the public and policy-makers. The full list of additional questions provided by respondents is available in Annex D.

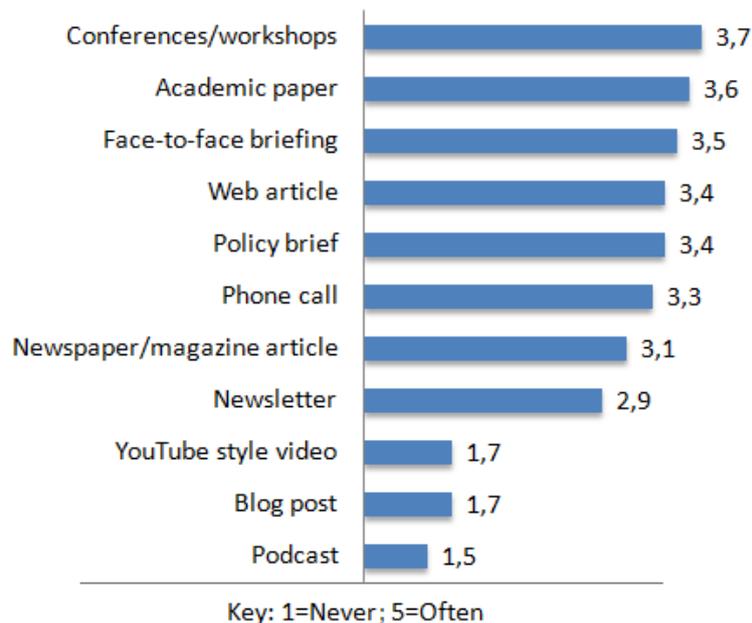
4 Channels of communication between science and policy

Use and effectiveness of channels of communication

Questions 7 and 8 of the survey assessed opinions on the different channels of communication used by respondents for accessing scientific information. Respondents were asked to rate a range of channels on their *frequency of use* (“Never” to “Often”) and their *effectiveness* (“Poor” to “Excellent”).

Figure 4 displays the responses obtained concerning how **frequently** the participants use each of the communication channels listed. Results show that ‘traditional’ channels are most frequently used by the respondents, who mainly favour conferences/workshops, academic papers, face-to-face briefings, web articles and policy briefs. Conversely, new media channels appear to be used less frequently, with YouTube style videos, blog posts and podcasts rarely used to access scientific data.

Figure 4 Mean frequency of use of various tools for accessing policy-relevant scientific information



Q7.How frequently do you use these formats used for accessing policy-relevant scientific information?

Ranking scale: 1=Never; 5=Often

Base: 47 responses received

Figure 5 displays results concerning the perceived **effectiveness** of the different communication channels. New media channels of communication (YouTube style videos, blog posts and podcasts) are viewed as less effective sources of scientific information when

compared to their traditional counterparts. For instance, face-to-face briefings are seen as the most effective channel of communication, while policy briefs and conferences are also highly favoured.

Figure 5 Mean perceived effectiveness of various tools for accessing policy-relevant scientific information



Q8.How effective do you feel these formats are in communicating scientific information to policy makers?
 Ranking scale: 1=Poor; 5=Excellent
 Base: 45 responses received

When relating the outcomes of both questions, the following should be pointed out:

- Policy briefs are seen as the 2nd most effective tool to access policy-relevant information, but are not as frequently used as other forms of written communication such as academic papers. This might be explained by the fact that a much larger number of academic papers are published and thus available for access than policy briefs.
- Academic papers are actually reported to be the 2nd most used source of information for stakeholders participating in the survey, but in the same time are seen as relatively ineffective for accessing policy-relevant scientific results. Indeed, academic papers are not targeted to answer specific policy questions but remain policy-relevant since they are one of the most reliable and easily available sources of information.
- Respondents even reported to use academic papers more frequently than newspaper and magazine articles, although they identify the latter as more effective. This could be interpreted as an association of the term effectiveness with the level of time and effort a certain article requires from the reader e.g. newspaper articles tend to be concise and simple to read, therefore they transmit the message more effectively. This however, does not assure the quality of the information, leading respondents to actually use academic papers more often.

- The size of the audience which can be reached by each tool should be drawn into consideration. The audience size of the most preferred formats (i.e. policy briefs and face to face briefing) is often targeting one person or a small number of individuals. Other formats, coming next in effectiveness (i.e. conferences/ workshops, newsletter or magazine articles, web articles and academic papers) can reach larger audiences of different disciplines/ sectors and thus, depending on the objective (and nature) of the communication be comparatively more effective.
- There is a dissonance between the use of “web articles” and the use of “blog posts”. The difference between the two channels is often blurred, which suggests that whilst respondents are using the web to access material, blog posts are poorly perceived as sources of reliable, legitimate information. Given the increasing debate (and use) over the value of blog posts as channels of communication for scientists to participate in dialogue with policy makers and the public, this result suggests a need to raise awareness of the value of such mediums for communicating legitimate, reliable information.
- In interpreting the survey results in view of the use of new media, it is also important to keep in mind the emphasis that the survey questions place upon accessing *scientific* information and not other types of data. While traditional channels are commonly perceived as delivering more formal and reliable content, new media are often associated to a context of social networking and entertainment, leaving them at a disadvantage when it comes to being regarded as repositories of scientific knowledge. However, new media offer numerous advantages as enhancers of communication and collaboration between stakeholders. This highlights the importance of bridging the gap between scientific/academic research and new media channels in order to make full use of the range of possibilities offered by the latter.

The outcomes of the survey on the use and preference of channels of communication indicate that:

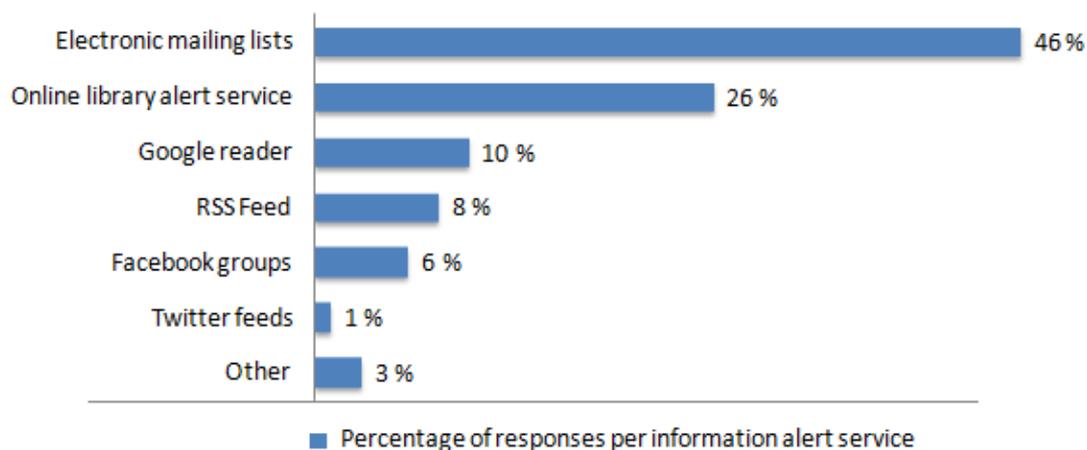
- Efforts to disseminate scientific information to policy-relevant communities should concentrate on communication channels which have been considered by several as effective (face-to-face briefings, policy briefs, conferences/workshops, newspaper/magazine articles), with specific emphasis on those not as frequently used yet (perhaps because not frequently available or easily accessible), such as face to face briefings, policy briefs and newspaper/magazine articles.
- Further work on the value of new media, especially blog posts and YouTube style videos, as communication channels of scientific information to policy makers is also recommended.

Subscription to alert services

Question 9 surveyed the use of information alert services such as mailing lists, RSS feeds and Twitter amongst respondents. Figure 6 indicates that the two alert services to which respondents mainly subscribe to are electronic mailing lists (46%) and online library alert services (26%). This suggests that the identification and use of suitable email lists (e.g. Science for Environmental Policy) will prove important in communicating the results of the BioFresh project to key stakeholders.

Similar to the previous section, new media services (Google reader, RSS feeds, Facebook, Twitter) appear to be less popular among the respondents.

Figure 6 Information alert services to which respondents subscribe



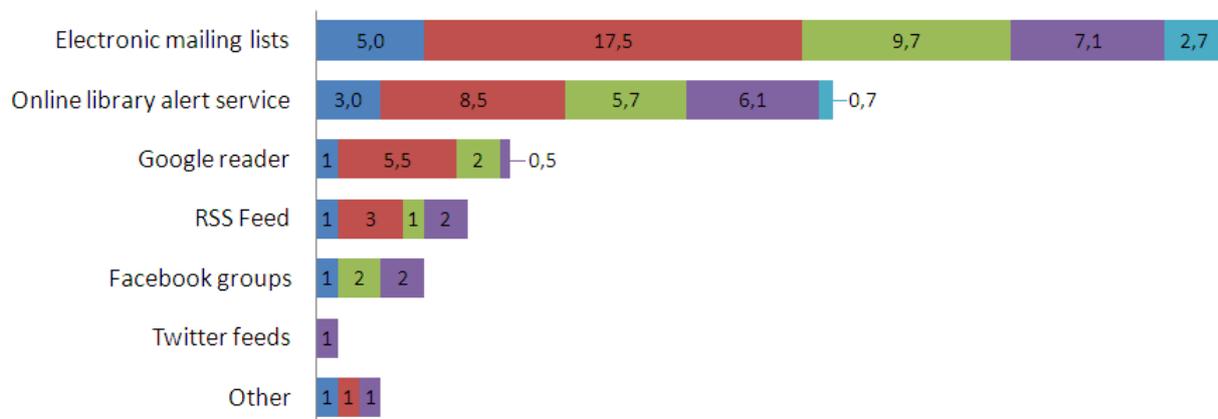
Q9. Which of the following category information alert services do you subscribe to?

Base: 91 answers from 42 respondents.

Responses by groups of organisations

Figure 7 indicates that electronic mailing lists are the most preferred alert services for all groups of respondents. Furthermore, they are the only information sources respondents from **industry associations** have reported to use. Online library alert services seem to be more frequently used by **universities, research institutes, consultancies** and **NGOs**. Google reader also seems to be used by a share of respondents from **government agencies and EU institutions**. Twitter feeds rank in last position with only participants from the sub-group **universities/research institutes and consultancies** reporting to use them.

Figure 7 Information alert services to which respondents from specific groups subscribe
Number of responses per information alert service



- Intergovernmental organisations
- European institutions and government agencies (national/regional/local)
- National and international NGOs
- Universities/research institutes and consultancies
- Industry associations

Q9. Which of the following category information alert services do you subscribe to?
 Base: 91 answers from 42 respondents.

5 Key messages

Perceptions of policy relevance of freshwater biodiversity

- ❖ The survey results suggest that **freshwater biodiversity is not yet a well established policy issue**. 48% of respondents to this survey view freshwater biodiversity as a *recognised policy issue but given little attention*. This suggests that work needs to be done, also via scientific projects like BioFresh, on finding means to turn political recognition of the issues into positive action.
- ❖ The survey results indicate that the most promising ways to **raise the policy profile of freshwater biodiversity** are related to the provision of evidence on the value of freshwater biodiversity (especially by recognition and demonstration of **ecosystem services**), **perception-based work** targeting the policy communities and the general public as well as better **integration of freshwater biodiversity in the implementation of other policies**.

For the latter, the most promising chances are given by the implementation of the EU Water Framework Directive, agri-environmental policies and biodiversity (conservation) policies as well as further work towards policy and inter-sectoral integration between water, biodiversity and agricultural objectives.

Relevance of policy-orientated science questions of BioFresh

- ❖ Certain policy-orientated science questions generated by the BioFresh consortium were highlighted by survey respondents as **highly policy-relevant**. These questions encompassed the **linking of ecosystem function and ecosystem services, multi-scale conservation planning** and freshwater biodiversity and ecosystem **response to climate change**.
All these topics are key tenets of BioFresh, which gives positive reinforcement to the aims and potential outcomes of the project. This outcome also indicates that the main policy-orientated dissemination efforts of the BioFresh project should concentrate on the identification of appropriate communication channels to inform stakeholders about project results on these topics, most relevant to their policy work.
- ❖ The BioFresh consortium also put forward policy-orientated science questions, which were rated by survey respondents as of **limited/less policy-relevance**. These questions encompassed the formation and

consequences of **novel freshwater ecosystems**, the value of **eco-informatics** and the framing and **perception of freshwater biodiversity**. These topics are important to the scientific community of freshwater conservation. Yet especially the issues of novel ecosystems and eco-informatics could be argued to be relatively new concepts for the policy communities keeping abreast of academic debates in ecology and conservation management. It is considered that awareness-raising efforts in an appropriate format on both topics remain important because of their potential value to policy decisions.

Channels of communication between science and policy

- ❖ Traditional formats of communication between science and policy communities, in particular face-to-face briefings, policy briefs, and conferences/workshops, are generally seen as the most effective, and as such are amongst the most used formats.

Acknowledgements

This report is part of a research project entitled Biodiversity of Freshwater Ecosystems: Status, Trends, Pressures, and Conservation Priorities (BioFresh) funded under the 7th Research Framework Programme of the EU (freshwaterbiodiversity.eu). The authors wish to thank Ana-Cristina Cardoso (JRC) for her useful comments on draft versions of this report.

Annex A. Survey questionnaire

Introductory text

Thank you for taking the time to complete this survey.

This survey aims to further our understanding of the main needs and interests of stakeholders and policy-makers in relation to freshwater biodiversity topics.

Often taken for granted, freshwaters are immensely diverse habitats – they cover only 1% of the Earth’s surface and yet contain 10% of all its animals and 35% of all vertebrates. They are subject to threats such as pollution, water abstraction and overfishing. No other major component of global biodiversity is declining at a faster rate than freshwater species and ecosystems. Their decline threatens the provision of the numerous ecosystem services they provide.

BLOCK A – General information

1a/1b. Which sector(s)/policy area(s) have you been actively working on?

In the last year

- Water
- Fisheries
- Agriculture
- Forestry
- Energy
- Transport
- Biodiversity
- Climate change
- Health
- Tourism/Leisure/Recreation
- Urban and regional planning
- Other _____

In the last five years

- Water
- Fisheries
- Agriculture
- Forestry
- Energy
- Transport
- Biodiversity
- Climate change
- Health
- Tourism/Leisure/Recreation
- Urban and regional planning
- Other _____

2. Which of the following best describes your organisation?

- Intergovernmental organisation
- European institution
- National government agency
- Regional/local government agency
- University/Research Institute
- Consultancy
- International NGO
- National NGO
- Industry/Trade Associations
- Corporation/Company
- Unions
- Other

BLOCK B - Perception of the relevance of freshwater biodiversity

3. In your policy-related work, how would you describe the current status of biodiversity as a policy issue? (not limited to freshwater biodiversity)

Please choose **only one** of the following:

- Established and active
- Established but declining in importance
- Recognised and increasing in importance
- Not an active policy issue
- I am not aware

4. Based on your level of involvement with biodiversity policy, how would you rate the prominence of **freshwater biodiversity** as a policy issue?

Please choose **only one** of the following:

- Established aspect of biodiversity policy
- Recognised, with clear actions to establish
- Recognised, but given little attention
- Limited or no profile
- I am not aware

5. In terms of achieving greater policy profile, what do you see as the key opportunities and barriers for freshwater biodiversity? Please state two for each.

Opportunities

A ...

B ...

Barriers

A ...

B ...

BLOCK C - Identifying the ,big policy issues‘ and their links to freshwater biodiversity

6. The following are examples of ten policy-relevant questions that the BioFresh consortium has identified. Please rank your perception of the relevance of these for policy and add any questions that you think we have missed.

Please choose the appropriate response for each item:

	Highly relevant	Moderately relevant	Of limited relevance	Not relevant	No opinion
1. How will freshwater biodiversity and ecosystems respond to climate change? 2. What is the value of eco-informatics (biodiversity data portals) to policy and policy makers? 3. What is the link between freshwater biodiversity, ecosystem processes and ecosystem services? 4. How do we quantify, map and value freshwater-related ecosystem services? 5. Does a focus on ecosystem services compromise efforts to conserve freshwater biodiversity? 6. Can we establish thresholds to balance extractive use with the maintenance of freshwater biodiversity and ecosystem services? 7. How do novel freshwater communities (without natural reference condition) form, how common is this phenomenon and what are their ecological and evolutionary consequences? 8. What are the mechanisms and effects of the spreading of invasive species and how can these be mitigated? 9. How do different groups frame and perceive freshwater biodiversity issues and who influences the science-policy-public dialogue? 10. How do we incorporate freshwater conservation planning into integrated catchment & water management? Please enter further questions you consider to be missing in this list. 11... 12...					

BLOCK D - Assessing preferences on channels of communication

7. The list below presents formats used for accessing policy-relevant scientific information. How frequently do you use these? 1=Never; 5=Often

Please choose the appropriate response for each item:

Format	1	2	3	4	5
Face to face briefing					
Phone call					
Conferences/workshops					
Newsletter					
Newspaper/magazine article					
Academic paper					
Policy brief					
Web article					
Blog post					
YouTube style video					
Podcast					

8. How effective do you feel these formats are in communicating scientific information to policy makers? 1=Poor; 5=Excellent

Please choose the appropriate response for each item:

Format	1	2	3	4	5
Face to face briefing					
Phone call					
Conferences/workshops					
Newsletter					
Newspaper/magazine article					
Academic paper					
Policy brief					
Web article					
Blog post					
YouTube style video					
Podcast					

9. Which of the following category information alert services do you subscribe to?

Please choose **all** that apply:

- Electronic mailing lists
- RSS feeds
- Online library alert service
- Twitter feeds
- Facebook groups
- Google reader
- Other (please specify)

Close-up questions

Thank you for your time!

Would you be prepared to undertake a short phone interview to go into greater depth on the topics covered in this questionnaire?

Please choose **only one** of the following:

Yes/no

If yes, please provide us with your email and we will be in touch.

Would you like to receive the results of this survey?

Please choose **only one** of the following:

Yes / No

If yes, please provide us with your email: _

Submit your survey.

Thank you for completing this survey.

Annex B. Survey invitation email

Dear colleague,

Please could you spare 10 minutes of your time to help improve the science-policy interface in the field of freshwater biodiversity.

BioFresh is a European Union FP7 project that is building a global data portal on the distribution, status and trends of freshwater biodiversity to support the science, policy and conservation of freshwater ecosystems (please see the attached interview detailing the BioFresh project).

To achieve this goal we would value your opinions of the status and profile of freshwater biodiversity as a policy issue, the potential synergies between freshwater biodiversity, and other areas of policy and the relevance of the policy-relevant science questions we as a consortium have generated.

At the end of this message you will find the link to a survey which is designed to generate a better understanding of the status of freshwater biodiversity within policy circles and design effective channels of science communication.

We at Biofresh are committed to a productive dialogue between scientists and policy-makers. We look forward to receiving your completed survey if possible within the next two weeks. We will make available the valuable findings of this survey to participants.

To answer the survey please follow this link:

<http://polls.ecologic.eu/index.php?sid=79853&lang=en>

Best regards,

Professor Klement Tockner

Coordinator of BioFresh

Director of the Leibniz-Institute of Freshwater Ecology and Inland Fisheries (Germany)

Annex C. Full responses on key opportunities and barriers for policy profile of freshwater biodiversity

Opportunities	
Opportunity 1	Opportunity 2
Better control of livestock in riparian zones - positive impact since decoupled payments in 2003	Areas
Climate Change debate	Business as usual mitigation response
Demonstration of value for the general public	CAP
Develop intersectoral approach	Control of livestock (aside from decoupled payments) is a voluntary option – i.e. agri-environment
Develop the valuation of ecosystem services	Coordination between existing databases
Drinking water	Different timeframes of both regulations
Eco services, including fisheries	Difficulties on integration between different sectors
Ecological status of water bodies	Dominance of engineers in water policy In Spain
Ecosystem approach	Economic crisis
Ecosystem based adaptation	Economical crisis
EU Directives Water Framework, habitats, birds	Economy
European legislation	Energy
F.d. is relevant for ensuring ecosystem services	Falls between marine and terrestrial
Genetic diversity	Public is poorly informed
Greater link to water/agriculture policy	Financial support
High public interest (freshwater)	Financing and resources
Holistic framework of legislation is in place	Focus on chemical status only
Improved linking with WFD	Industry pressure on government not to act
Improving understanding and engaging with land managers	Lack of coordination among scientists and policy makers
Increase the awareness of ecosystem services	Lack of data

Integration of EU Directives	Lack of locally available data and expertise in the field
Integration of WFD, BHD and HD	Links between scientists and policy makers
International projects	Little knowledge in aquatic flora
Large interest in fish communities	Low interest in the general public
More information of the public	Mal-adaptation
New research infrastructure and innovative tools	Narrow focus on ecosystem services
One voice	Poor collaboration between responsible government departments
Policy integration	Public awareness
Political attention	Public understanding of real issues
Public health	Quality in the shadow of water quantity
Recognition of ecosystem services	Request for an increase of energy generation by renewables - and hydropower in particular - also increases the threat for F.D.
Rise of water as an issue	Responsibilities (shifting from one administration to the other)
Synergetic link between water management and nature protection	Scattered information
Use show cases	Seen as a nice to have rather than essential
Water framework directive	Separating water resources from biodiversity
Water is a critical resource	Simply going down a regulatory approach
water scarcity/security	State servants in water sector not aware of importance of biodiversity
WFD	Trans-national governance issues
WFD	Water and biodiversity communities are different
WFD	Water seen as first and foremost a resource, not a habitat/ecosystem
WFD	Water seen as resource
WFD	WFD
Barriers	

Barrier 1	Barrier 2
Aligning water and biodiversity environmental objectives	Better interlinkage-communication between policy makers dealing with different subjects
Awareness raising	Biodiversity is still very low in political agendas
Better document the consequences of biodiversity loss	Blame culture alienates rather than engages people with the problem
Better implementation of relevant EU Directives	Broad spatial scales at which issues need to be addressed
Better management of inputs - agri-environment measures and cross-compliance have helped	Bureaucracy (most of all EU reporting)
CAP reform/increasing water scarcity	Climate
Climate change adaptation	Common understanding is missing in some cases
Climate change mitigation can benefit water	Competition
Ecosystem health	Complexity of science-policy/trans-disciplinarity
Ecosystem services	Cost/value implications of biodiversity no appreciated
Energy debate	Economic interests for short time
EU Directives	Failure to establish scientifically robust water quality standards necessary to support biodiversity objectives
Exchange of data	Few resources due to other responsibilities by law, low pressure to act on biodiversity
F.d. is part of the goals set by the Water Framework directive	Focus on water rather than species/habitats
HRMP	FW biodiversity invisible to most
Identify freshwater biodiversity priority areas	In times of economic problems environmental aspects become less important for the public and policy makers
Increasing awareness of freshwater biodiversity	Knowledge gaps for implementation
Involve biodiversity aspects in environmental work, forcing laws	Lack of knowledge and investment in basic science research
Involvement in IPBES/CBD	Lack of public pressure

Large interest in aquatic activities	Lack of relevant information
Long term monitoring	Misuse of the issues at stake by single interest organisations
Many recreational users	Money
New concepts in sector (green infrastructure, climate change adaptation, wetland restoration)	No awareness on aquatic communities except fish
New EU Strategy	Not enough work across sectors (eg. energy, conservation)
New generation of professionals	Over-development of water resources
Policies established	Political importance
Precautionary principle	Powerful vested interests
Public and institutional awareness of loss of biodiversity	Propriety and quality of data
Public awareness	Too high emphasis on ecosystem structure versus function
Raising awareness about invasive species	Transportation
Resource constraints, private sector engagement	Undervalued ecosystem services make the importance of freshwater biodiversity highly undervalued and as a consequence not a priority
Shift attention to ecosystem functioning	Very costly measures to improve status
Tools are available	Water still seen primarily as an economic driver in Spain
Use of targeted agri-environment schemes can be a effective tool and needs further exploring	Wrong incentives produce wrong choices
Water quality issues	

Annex D. Additional policy-orientated questions raised by survey respondents

Most of the questions received could be classified in one of the following general categories: Issue perception/framing, ecosystem services, knowledge/research, energy debate, policy agenda, financing and resources.

Issue perception/framing

- Freshwater is the most limited and undervalued resource and needs prioritisation to ensure it remains optimally functional and productive
- How do we convince the general public that their impact is probably larger than that of industry?
- How to create the understanding that access to freshwater underpins most life (other than some marine)?

Ecosystem services

- How do we quantify/amplify the recreational value of freshwater biodiversity? How does the ecosystem services approach fit in the implementation of relevant EU Directives, e.g. WFD or FFH? I would like to see a closer linkage to the practical implementation in the EU member states.
- How can ecosystem services be used for impact assessment of water and biodiversity policies?
- How can scientists best communicate benefits of ecosystem services to the policy maker?
- Do ecosystem services provide a good tool for analysis of different policy options related to biodiversity?

Knowledge / research

- How much are fresh-transitional-marine water ecosystems interconnected and how do we carry out an integrated basin management?

Energy debate

- How do we balance energy development with freshwater biodiversity conservation?

Policy agenda

- How can we support the practical work of people on the implementation level?
- How do we improve the coordination between relevant public authorities whose policies have an effect on freshwater biodiversity?
- Is biodiversity conservation adequately integrated into the agricultural policies?
- How can we speed up the adoption of technologies that support freshwater conservation in several sectors?

Financing and resources

- How to leverage the role of the private sector (e.g. through supply chains) in public policy and freshwater conservation?

Other

- How to maintain or restore freshwater ecosystems when most European rivers are highly modified by energy and transportation infrastructures?
- Navigation is another important user and not only extractive; in particular in view of energy-saving in transport
- The effects of the water quality on conservation status of freshwater species and habitat
- Is the future of R&D in freshwater biology and ecology safe given current freshwater biodiversity management and conservation challenges?
- Ecological requirement on water quality for freshwater species and habitat