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Comment

**BRIDGING THE GAP BETWEEN SCIENCE AND POLICY:
THE IMPORTANCE OF MUTUAL RESPECT, TRUST AND THE ROLE OF MEDIATORS**

Exploring the ways environmental science is used and valued by policy-makers in Portugal: a case study

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ABSTRACT: Policy-makers, researchers and the general public seem to agree that there is a need for evidence-based policies. Here we report on a case study which explores environmental policy-making at the national and local levels in one European country, Portugal. The case study focuses on understanding how that scientific evidence is used and valued by policy-makers. Our data show that in Portugal there are opportunities at national and local level for scientific evidence to influence environmental policy-making and there is a general belief amongst policy-makers that scientific evidence is essential for the development of solid and trustworthy policies. However, challenges remain, including difficulties in working together and challenges imposed by the policy cycle. The bridge may not yet be fully constructed, but in Portugal, policy-makers largely recognise the need for scientific evidence and the research community is beginning to reach out, looking for ways to connect with the policy community.

The case study: setting the background

Emphasis on ensuring that environmental policies are built on a sound knowledge base is increasing, and this can be observed at all levels of governance (local, regional, national and international).[1,2] This emphasis and the need for evidence-based policies come from the recognition that increasing and clarifying the available alternatives through evaluation of scientific evidence improves environmental decision-making.[3] In 2008, the then Commissioner for Science and Research (Directorate-General for Research) Janez Potočnik stated that he was very interested in understanding and debating how science should inform policy-makers.[4]

Recent work in our research group has examined the opportunities for scientific evidence to influence environmental policies.[5,6] Here we report on a case study which explores environmental policy-making at the national and local levels in Portugal. Portugal is a small country with different tiers of governance: a large portion of environmental legislation is adapted by the national government from European Commission directives, before implementation at national and local level. This model is widely used in Europe; Steurer[7] describes the example of sustainable development in Austria, which cuts across "boundaries between vertical tiers of policy-making, from supranational institutions like the European Commission, via federal and county governments, to city halls".[8] After joining the European Union in 1986, political and governmental structures such as the Ministry of the Environment and the Portuguese Environmental Agency were created to regulate and oversee environmental policies in the country. As part of the European Union, Portugal must adopt European legislation by transposing directives and norms regarding environmental policies into the national legal framework. It is the national government's responsibility to achieve and maintain compliance with European Commission legislation and the national government ministry or department responsible for the environment has the overall responsibility for implementing the legislation in this sector. In addition, other national government ministries or departments and their expert institutes are likely to be involved at various stages in the planning and implementation of horizontal legislation.[9] Despite having to comply with the European Commission's environmental legislation, there is room for science to influence environmental policies in

Portugal, since there is a need to tailor that legislation and adapt it to the specific situations within the country. Our study focused on understanding the current ways that scientific evidence is used and valued by policy-makers during the implementation of policy at both national and local level.

National policy-making

Interviews with national policy-makers and researchers explored the ways that environmental science is used and valued by policy-makers working at the national level.[10] Our data show that there are many opportunities at national level for scientific evidence to influence environmental policy-making and decision-makers clearly believe that scientific evidence is essential for the development of solid and trustworthy environmental policies. All interviewees from national government indicated that scientific evidence was currently used in the process of developing and implementing environmental policy in Portugal; as they explained, they would not do it any other way:

> *It is a recurring situation in this Institution, we do not develop specific policies without having some degree of technical and scientific evidence. (Interviewee 6, National Government Member)*

The same interviewee went on to explain how important and widespread this practice is in his institution, clarifying that the vast majority of their work depends not only on technical and scientific evidence but also recommendations from scientists, implying that at national level, policy-makers and scientists work together and that policy-makers seek advice and expert knowledge from researchers.

Interviewees provided details regarding how scientific evidence is used and gave a number of specific examples. One example provided by Interviewee 08 (National Government Member) concerned national biodiversity policy; when the "Red Book of Vertebrates" which relates to the IUCN (International Union for Conservation of Nature) Red list needed review, teams of experts were put in place. These teams were overseen by the appropriate national government department and were mostly comprised of researchers and other academic experts. After the book was published it provided the basis for decision-making regarding problems such as environmental impact assessment and land-use planning. Another example, provided by Interviewee 06 (National Government Member), highlighted the use of scientific evidence in national environmental policy-making related to costal area management. When reviewing the policy, it became necessary to define new planning instruments and to develop plans for management that would cover the entire country; this work had to be externally commissioned. One of the conditions of the tender was that any private company applying to undertake the work would have to work with Universities to ensure that appropriate scientific evidence and expertise was taken into account – national government would not accept work without such scientific input. Interviewee 08 (National Government Member) provided a third example that highlights that, in some cases, national government is dependent on the scientific community to move forwards with a policy. This case involved a review of the exotic species legislation which could not be finalised until the scientific community had put together a list of species considered exotic. These specific examples illustrate some of the ways that scientific evidence is used to support environmental policy-making at the national level in Portugal.

Local policy-making

We also explored the ways in which scientific data are used to help inform local environmental policy-making, through interviews with local government members and by specifically asking about environmental policy-making at the local level when interviewing researchers. These interviews suggest a more mixed picture of the extent to which scientific evidence is used regularly by local government policy-makers. Our interviews uncovered quite diverse opinions about the use of scientific evidence at the local level, ranging from those who believe that scientific support is crucial for the development of effective policy to others who did not value such evidence or see how it might support effective policy-making. Much seems to depend on how open the policy-maker is to using scientific evidence. There is some evidence from our interviews that this is a changing picture, with local government policy-makers beginning to champion the use of scientific evidence in policy-making. One interviewee explained that

there is a need to change the habits of policy-makers, encouraging them to think about incorporating new sources of evidence when developing and implementing policy:

> *I think that not only is there an opportunity but there is also a need, because there is a need to break habits [of policy-making] […] and only science will show decision-makers how to do it and what are the new avenues to do it. (Interviewee 16, Local Government Member)*

The same interviewee highlighted a feeling amongst local policy-makers that the Portuguese scientific community was not particularly interested in engaging with decision-makers, either in terms of disseminating their research findings in ways that are accessible to policy-makers or in terms of undertaking applied research designed to address specific policy problems:

> *It is also true that, for many years, the scientific community has been turned into themselves, they produce for themselves and they listen to themselves. Also, the applicability of the research and studies was little or none. (Interviewee 16, Local Government Member)*

In addition to a perception that scientists were not interested in engaging with policy-makers and that scientific research had little relevance to local problems, interviewees raised the question of the importance of environmental issues to the local community. Local policy-makers have to balance the cost of incorporating scientific evidence, which may involve commissioning specific research, against other local priorities, such as health, education and justice issues. Nevertheless, there are policy-makers at the local level for whom scientific evidence seems to mean excellence, almost as if the science in some way is a stamp of quality:

> *We have been witnessing that more and more; when we have a project we feel the need of a scientific collaboration to ensure that the projects have real quality. I think increasingly, especially in the environmental area, we feel more necessity to work with the University. (Interviewee 19, Local Government Member)*

Regardless of the challenges, there are opportunities at local level for science to influence environmental policies and for researchers and policy-makers to work together. The contribution of science to environmental policy is seen as crucial to local government and it seems that "collaborations" with scientific institutions (quite frequently local ones) are a regular occurrence in Portugal. These collaborations might be through personal connections or through specific projects and work-groups that are created when needed. Policy-makers may work with researchers on a regular basis, having meetings together etc., or seek their advice and help for specific projects and problems. Researchers provided more information on how these collaborations with policy-makers work. Generally, when these actors work together the policy-maker defines the objectives and the researcher is responsible for the methodology. Researchers stated that despite minor limitations, they usually have complete freedom in shaping the direction of the research and in defining the research agenda:

> *The policy-maker has this approach "I want this and you have this amount of time to do it. How you do it, it's up to you". (Interviewee 13, Researcher)*

The freedom researchers have when working with policy-makers was praised by the majority of participants, but some commented that sometimes they have too much freedom, and that policy-makers ought to provide more guidance.

Local governments seem more disposed to work with a university if it is local. This is due to personal and professional connections between researchers and policy-makers, which often leads to trust between the actors involved, as well as the physical proximity between the universities and the local authorities.

> *I would say there are opportunities especially at local level, where the contact and mutual trust makes it easier. (Interviewee 25, Researcher)*

One local policy-maker interviewed stated that the relationship with the local university was extremely important and that regular meetings were held. He went on to explain that one of his biggest sources of scientific information was *"the very close personal contact we have with the university"* (Interviewee 19, Local Government Member).

Local government members were able to provide specific examples of how science influences local environmental policy-making. Interviewee 19 explained that their local council is part of a sustainable construction platform, a consortium formed by an array of companies, research centres, local councils, and other agents which aims to promote sustainable construction as well as establish collaborations between companies and research centres. Being part of this consortium provides access to the local scientific community.

Another example highlights the relationship between policy-makers and researchers. Interviewee 16 explained that in an area with abundant aromatic and medicinal plants, the local council decided to create a seed bank, as well as market and sell the plants. In order to carry out laboratory tests to assess the full potential of the plants, the local government had to work in partnership with a research department within a university, which was responsible for the biochemical analysis of the plants.

Issues and challenges

In Portugal, both at national and local level, there are issues and challenges in environmental policy-making. National and local government participants stressed that although there are opportunities for science to feed into policy, these opportunities are not always available and there are particular times in the policy-making cycle where it is difficult for scientific evidence to be incorporated. Some difficulties include the fact that a number of Portuguese environmental policies originate from European Commission policies, limiting the amount of influence that national scientists can have in the policy formulation.

Furthermore, some interviewees felt that there were only limited opportunities for scientific evidence to inform policy. These arise partly from a lack of awareness amongst the scientific community (and universities) about their role in relation to policy-making, and because many in the scientific community are not pro-active in reaching out to the policy community.

> *I think that [opportunities for science to be incorporated] is far below what is required. It lags behind not only due to the nature of the Portuguese Administration, but also because of the national scientific community. (Interviewee 8, National Government Member)*

The lack of interest amongst scientists in communicating outside the academic community was also mentioned by Desborough and Kilfoyle[11] as a barrier in the relationship between policy-makers and researchers. This relationship has been the subject of a number of studies in the past,[12,13,14,15,16] which indicate that between these two actors there are different views on the use of scientific evidence and lack of trust and respect, as well as barriers such as different languages, goals and attitudes towards information. Participants in our study indicated additional barriers and our data also suggest that in Portugal the universities in general and the scientific community in particular are still insufficiently aware of the role they could be undertaking in relation to environmental policy-making. There is also the issue of priorities: due to financial constraints, universities are very much focused on self-financing, giving less importance to the relationship with external actors such as policy-makers. External pressures, such as the pressure to produce scientific publications, are one of the reasons why researchers do not engage more frequently with policy-makers, as explained by one researcher:

> *The University is under pressure, we look at the rankings and it's papers and more papers. (Interviewee 25, Researcher)*

While the importance of science and scientific evidence is obvious, interviewees also pointed out that policies can not be shaped exclusively by it, offering a balanced and realistic view of policy-making.

> *Yes, I think there are many opportunities for science to be incorporated into environmental policies. This is different to say that environmental policy is based on science day by day – that is not quite the case. Policies are made up of many factors: regional, economic, and political. Science is of course part of the equation. (Interviewee 21, National Government Member)*

The view of this interviewee is supported by Choi et al.[17] who argues that 'scientific evidence is only one consideration among several'. Scientific evidence is an important factor and, depending on the specific case, can be decisive in the policy-making process. But this complex process includes a number of other

factors such as political commitments, economic pressures and social issues. The role of the decision-maker faces many challenges as "*the policy-maker has to balance it all"* (Interviewee 24, Researcher). Other factors to be taken into account in a policy context include emotions and the views of interest groups.[18] This complexity is recognised by both the policy-makers and researchers interviewed in our study.

Concluding remarks

The relationship between scientific evidence and policy-making remains complex and includes many challenges. Researchers and national and local policy-makers seem to agree that, in Portugal, there are opportunities for science to influence environmental policies and the Portuguese policy environment is changing to demand more scientific evidence to underpin policies. Data indicate that while opportunities to incorporate research into policy are available, it is sometimes difficult to take full advantage of these opportunities due to the lack of awareness of researchers and policy-makers, and environmental policies originating from the European Commission for example.

This research highlights the opportunities for science to influence environmental policy but it also uncovered the challenges and barriers within this process. There is a need to bridge the gap between science and policy and to this end better communication paths among policy-makers and researchers are needed. These paths may be in the form of networks connecting local policy-makers and local researchers. Knowledge brokers, specialists in developing relationships and networks may also play a key role, by assisting policy-makers and researchers in understanding each other and the part each plays. Knowledge brokers, such as specialists in science communication, may also help break barriers such as language, different timescales and different perspectives as well as expectations. In order for science to have a stronger influence in policies, policy-makers should be more exposed to science and researchers should be more aware of their role in relation to environmental policy-making.

Reluctance, lack of awareness and drive in the scientific community to proactively engage with policy-makers and the policy community appear to be factors that may continue to limit the extent to which scientific evidence is consulted and evaluated throughout the policy cycle. Despite this, at a local level, when there is physical proximity, as well as respect and trust between the two actors, opportunities exist and policy-makers tend to call upon the expertise of researchers and universities. Examples presented here highlight particular opportunities to collaborate at local level, given the proximity between local government and research institutions. Also, at a national level, using scientific evidence at least while seeking advice and studying different options, seems to be becoming the current practice in Portugal.

Three main aspects were identified during this research:

1. Using science in environmental policy-making is seen as a stamp of quality.
2. How open the policy-maker is to incorporate science seems to greatly influence the extent to which scientific evidence is regularly used.
3. Physical proximity between researchers and policy-makers creates more opportunities for these actors to work together and for science to influence policy-making in Portugal.

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