CHAPTER 12

Information Needs for Environmental Policy Making: Some Orientations for the Future

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Introduction

Recent good practice has highlighted the need for evidence-based policy in all fields, including that of the environment (1). There is an ongoing need for reliable information to inform the policymaking process. A strong evidence-base also contributes to more robust design and assessment of policy options. In the environmental field, the putting in place of environmental monitoring processes and the regular publication of state of the environment reports have contributed significantly to providing a better evidence base for policy. The EU-funded ERDF project has played an important role in upgrading national environmental monitoring programmes, and further related projects also addressing particular thematic areas in the environmental field are planned for the next structural funding period up to 2020. This paper puts forward a set of orientations for the future to be taken into account in order to improve the evidence base to support national environmental policy-making processes, including the monitoring of existing policies, now that the data from the ERDF monitoring project is becoming available. The basis of the analysis is the authors' work on monitoring the implementation of the National Environment Policy and previously on state of the environment reporting.

Background: The Need for a Strong Evidence-Base for Environmental Policy

The Rio+20 Summit highlighted in its outcome document *'The Future We Want'* the importance of a strong evidence-base for policy. Its section on institutional framework capacity for sustainable development aims to:

76 (g) Promote the science-policy interface through inclusive, evidence-based and transparent scientific assessments, as well as access to reliable, relevant and timely data in areas related to the three dimensions of sustainable development...

Furthermore, one of the roles of the planned High-level Political Forum, a major

outcome of Rio+20, is to 'Enhance evidence-based decision-making at all levels' (para 85l).

At a European Union (EU) Level, Priority Objective Five of the nine priority objectives of the EU's 7th Environment Action Programme (7th EAP) (2) is 'to improve the knowledge and evidence base for Union environment policy.' In para 71, the 7th EAP highlights the following five knowledge gaps at an EU level:

i. **complex issues related to environmental change**, such as the impact of climate change and natural disasters, the implications of species loss for ecosystem services, environmental thresholds and ecological tipping points, planetary boundaries, systemic risks and society's ability to cope with them, mapping and assessing ecosystem services, understanding the role of biodiversity in underpinning such services, as well as understanding how biodiversity adapts to climate change and how the loss of biodiversity affects human health;
ii. **the interplay between socio-economic and environmental factors,** sustainable consumption and production patterns, how the costs and benefits of action and the costs of inaction can be considered more accurately, how changes in individual and societal behaviour contribute to environmental outcomes and how Europe's environment is affected by global megatrends;
iii. **uncertainties surrounding the human health and environmental implications** of endocrine disruptors, the combined effects of chemicals, certain chemicals in products and certain nanomaterials;
iv. **chemical exposure and toxicity**;
v. clear overview of **GHG measurement, monitoring and data collection**, which is currently incomplete for key sectors.

The 7th EAP highlights the need to continue to develop and improve environmental information systems since 'certain new and emerging issues arising from rapid technological developments that outpace policy, such as nanomaterials and materials with similar properties, unconventional energy sources, carbon capture and storage and electromagnetic waves, pose risk management challenges and can give rise to conflicting interests, needs and expectations.' It stresses that to avoid 'increasing public concern and potential hostility to new technologies ... [t]here is ... a need to ensure a broader, explicit societal debate about the environmental risks and possible trade-offs that we are willing to accept in the light of sometimes incomplete or uncertain information about emerging risks and how they should be handled. A systematic approach to environmental risk management will improve the Union's capacity to identify and act upon technological developments in a timely manner, while providing reassurance to the public.'

Key commitments emerging from the 7th EAP related to the fifth priority objective are listed in Box 1 below.

Box 1: Commitments from the EU 7th EAP regarding Priority Objective 5 (to improve the knowledge and evidence base for Union environment policy)

In order to improve the knowledge and evidence base for Union environment policy, the 7th EAP shall ensure that by 2020 (3):
(a) policy-makers and stakeholders have a more informed basis for developing and implementing environment and climate policies, including understanding the environmental impacts of human activities and measuring the costs and benefits of action and the costs of inaction;
(b) the understanding of, and the ability to evaluate and manage, emerging environmental and climate risks are greatly improved;
(c) the environment science-policy interface is strengthened, including the accessibility of data for citizens and the contribution of citizens' science;
(d) the impact of the Union and its Member States in international science-policy fora is enhanced in order to improve the knowledge base for international environment policy.

This requires, in particular:
(i) coordinating, sharing and promoting research efforts at Union and Member State level with regard to addressing key environmental knowledge gaps, including the risks of crossing environmental tipping-points and planetary boundaries;
(ii) adopting a systematic and integrated approach to risk management, particularly in relation to the evaluation and management of new and emerging policy areas and related risks as well as the adequacy and coherence of regulatory responses. This could help to stimulate further research on the hazards of new products, processes and technologies;
(iii) simplifying, streamlining and modernising environmental and climate change data and information collection, management, sharing and re-use, including the development and implementation of a Shared Environmental Information System;
(iv) developing a comprehensive chemical exposure and toxicity knowledge base which draws on data generated without animal testing where possible. Continuing the Union's coordinated approach to human and environmental biomonitoring including, where appropriate, standardisation of research protocols and assessment criteria;
(v) intensifying cooperation at international, Union and Member State level on the environment science-policy interface.

On a national level, the National Environmental Policy (NEP) contains a policy to: 'improve research and information about the environment.' The NEP states in its section on policy implementation that '[e]nvironmental information is an essential building-block for good policy.' It also notes that '[r]esearch is a prerequisite for information provision, as it lays the groundwork for developing monitoring systems as well as for evaluating and improving policy responses.'

Relevant measures in the policy include ensuring that all major environmental media are covered by environmental monitoring programmes (3.4.1) (which the ERDF project that is the subject of this publication has gone a long way towards achieving), and measure 3.4.5, which aims to strengthen the environmental policy research function within Government. Other related NEP measures that highlight particular areas of environmental policy call for the investigation of the sources of significant risk factors in terms of soil contamination (2.3.31), for the setting up of an integrated maritime information system (2.3.12), for research and development in the aquaculture field (2.3.25), for an adequate waste information system (2.3.36), for the preparation of national impact scenarios on climate change (2.6.3), and for an adequate knowledge-base, including baseline information, about national biodiversity and ecosystems (2.6.14). Furthermore NEP Pilot Project 3 calls for research and development into more efficient use of resources in the construction sector.

Considerations Emerging from the NEP Monitoring Process

The NEP is the subject of a robust monitoring system whereby its over 250 monitoring indicators are kept under observation. The process of gathering monitoring data has pointed to gaps in a number of areas. In the section on the green economy, data gaps are found in the area of green jobs, green accounting, organisations with environmental certification, and whether contracts for goods and services falling under the product groups covered by green public procurement are encouraging eco-innovation. In the field of environmental health, linked data on environment and health is not yet available, although certain important studies linking air quality and children's health have been carried out (4). An Environmental Health Inequalities Report for Malta (5) was also published in 2013, which linked social, environmental and health data in innovative ways.

In the section on resources, the major data-gaps relate to an update to the mineral resources lifespan projections, marine and coastal quality data, and the risk factors affecting soil quality. As one of the key measure promoted by the NEP, information on current levels of pedestrianisation in the various localities is also required, and is not yet available. The NEP monitoring process also identifies that while better compliance is one of the NEP's key pillars for improving policy implementation, data on the impact of

general binding rules on the local environment, and enforcement complaints is not readily available.

Some Key Research and Information Needs for Malta

On the basis of the above considerations, as well as previous experience in state of the environment reporting, this paper highlights four areas of particular concern. First, a key area where information remains a challenge is the marine environmental field, where the significant costs involved present challenges. Another key area is that of sustainable housing, where significant research and innovation will be required in the move towards zero-energy housing in line with national obligations. At another level there is a need for integrated assessments that highlight the links between datasets such as environmental and health data, and the economic and environmental data, with examples of data needs in the latter case relating to green accounting and green jobs. Finally, on this basis, integrated models will need to be developed that link the environmental data to socio-economic parameters to facilitate the testing of various policy options and measures.

The marine environment

One of the key areas where more information is required is the marine environmental field, where the higher cost of data gathering presents particular challenges. The NEP in its measure 2.3.12 calls for an integrated maritime information system structured to reflect EU monitoring requirements. The EU monitoring requirements emerge from the Water Framework Directive (WFD) (covering the coastal area up to 12 Nm), the Marine Strategy Framework Directive (MSFD) (which covers the area between the 12 Nm boundary and the 25Nm Fisheries Management and Conservation Zone covering marine waters where a Member State has and/or exercises jurisdictional rights, in accordance with the United Nations Convention on the Law of the Sea), and the Habitats and Wild Birds Directives. The integrated maritime information system is envisaged to draw together information both about the state of the environment in terms of biological and chemical status, as well as overlying information about trends in economic and social pressures having an impact on marine areas, such as fisheries, aquaculture, maritime shipping and offshore infrastructure. The commissioning of such a joint database would facilitate a clearer understanding of the implications of policy measures.

Some of this information has already been gathered, for example as part of the Initial Assessment undertaken to implement Article 8 of the MSFD. The Initial Assessment covers characteristics, current environmental status (based on an analysis of chemical, physical and biological characteristics pertaining to the marine and pressures and impacts thereon on the marine area), and an economic and social analysis of the use of those waters and of the cost of degradation of the marine environment. The wide-ranging

scope of this type of assessment allows for more powerful analysis of the implications of policy options, as discussed later in this paper in the section on integrated assessments. Important ecological and chemical monitoring data for the coastal area has also been made available by means of the first comprehensive baseline monitoring carried out as part of the implementation of the First Water Catchment Management Plan 2011-2015, which implements the WFD in coastal areas. The Initial Assessment noted above, which was undertaken as part of the initial requirements of the MFSD, incorporates part of the data generated by this baseline monitoring of coastal waters. Malta is committed to address some of the data gaps pertaining to the marine environment, as identified by the MSFD Initial Assessment, through the development and implementation of the MSFD monitoring programme, which is due in 2014.

Other information related to marine biodiversity has been gathered as part of the implementation of Article 17 of the Habitats Directive, however there are still data gaps related to the marine environment. Malta's Article 17 report (6) indicates that 15.4 percent of priority species under the Directive remain of unknown status, 7 out of 8 of which are marine species. The two LIFE projects (Migrate and Baħar) should lead to additional information on the marine environment, which should feed into the next Article 17 report. Further initiatives will also be considered to address data on marine species not covered through ongoing projects (7).

Sustainable housing

A second knowledge-gap relates to the field of sustainable housing and the relationship between energy consumption and the built environment more generally. Significant research and innovation in this area is required as Malta seeks to implement its obligations in relation to the 2010 EU Directive on energy performance in buildings (8). This Directive indicates that by end December 2018 all new public buildings (of specific dimensions and uses) will need to be nearly zero-energy, a criteria that will apply to all new buildings by end December 2020. The University of Malta is already working in this field, looking at a range of issues related to energy use and the built environment, ranging from building materials to retro-fitting of existing building, behavioural aspects of zero-energy building, and innovative concepts such as green roofs (9).

NEP Pilot Project 3 highlights the importance of this area, identifying the need for more research, including policy research, on resource use in the construction sector (see Box 2). This pilot project lists particular knowledge gaps in three areas of the built environment: re-use and recycling of stone; the characteristics of vacant property and possible policy options to address them; and, retro-fitting existing buildings to improve their resource efficiency.

Box 2: Extracts from NEP Pilot Project 3

The efficient use of stone, land, energy and water resources in the construction sector is constrained by three factors: the low level of re-use and recycling of stone; the large stock of vacant property (10); and, the lack of knowledge in the area of retro-fitting the various types of existing properties to make them more energy- and water-efficient. In order to address these issues in a coordinated manner, it is necessary to examine the reasons for the high levels of vacant property in the Maltese Islands, and which policy options and measures would be most suitable to address the vacancy rate. In addition there is need for research and development to propose technological options for the improved quarrying, re-use and recycling of stone. Research into policy options and measures to encourage the re-use and recycling of stone, based on observations of operational constraints in current major projects, is also required. Perhaps one of the most urgent research needs, because it relates to legal obligations with a fixed timeframe, relates to the Energy Performance in Buildings. In this respect it becomes an urgent research priority to examine various technical options for the retrofitting of existing buildings, and to examine policy options and measures that may be used to encourage the retrofitting and upgrading, with a view to re-occupation of existing buildings in particular areas (historic, early-modern, recent). In the case of historical areas, the study should address what is needed for the buildings to support living communities in the 21st Century.

Integrated assessments

Due to the complexity of environmental interactions, integrated assessments that identify and characterise links between the physical environment and socio-economic drivers and impacts are increasingly necessary. Some of these integrated assessments are called for within environmental directives (such as the MSFD) or mentioned (as noted above) in high-level policy documents such as the 7th EAP, which *inter alia* calls for further work within environmental health on human and environmental biomonitoring. Candidate areas for such type of assessments are therefore datasets linking environmental and health data, and those linking economic and environmental data. The NEP monitoring process, as noted above, identifies significant data gaps in these areas where integrated assessments are required: the green economy (e.g. green jobs and green accounting) and environmental health.

Integrated models

Further to the gathering of integrated datasets, models will need to be developed that link environmental data to socio-economic parameters, which will enhance capacity for

testing policy options. The principal reason why models are required is the complexity of environmental interactions (between the different media), as well as the complexity of the interactions between human activities and the environment. Modelling is currently used to generate data (11) and also for testing of economic measures in the socio-economic field.

What is envisaged here are models that can be used to predict both the socio-economic and environment outcomes of particular policy options and measures. In certain policy areas the need for such models is already necessitated through EU-related obligations – for example in the area of air quality. As per Annex XV of the Air Quality Framework Directive, information to be provided under Article 23 (air quality plans) includes an 'estimate of the improvement of air quality planned and of the expected time required to attain these objectives', which requires a model of the complex interactions between environmental and anthropogenic variables that affect air quality. Although such integrated models are required, this does not mean that there are no significant challenges involved, primary of which is likely to be the dearth of long time series data on environmental quality.

Further Observations

A few further observations are appropriate before closing. First, it is important that steps are taken to ensure that the results of environmental monitoring can be used by a variety of stakeholders. Open access to environmental data, in line with the Aarhus Convention and the 7th EAP's concerns regarding citizens' science, will allow more and better use of the data and will also increase public trust in the data and the systems that underlie it. This is one of the strengths of the ERDF monitoring project, and the Shared Environmental Information System model it incorporates. The integrated assessments and modelling exercises that are the subsequent fruit of monitoring programmes should also be made available.

Second, the issue of capacity to use publicly-available information needs to be borne in mind. Sophisticated computer skills and software are not widely available (or accessible), so information needs to be presented in a variety of formats to be accessible to a range of users, ranging from raw data that requires sophisticated software to access, to easily-understandable and attractively-presented information of the ilk of state of the environment reports.

Third, in relation to the scope of environmental and related monitoring programmes, it might be useful to bear in mind the following issues as national monitoring programmes are designed and updated. The first concerns what parameters to monitor: Professor Victor Axiak of the University of Malta, at a recent conference on the Mediterranean Environment (12), cautioned about focussing national monitoring programmes solely on parameters identified in legal requirements emanating out of the EU *aquis*, as some environmental

issues might be particular to Malta. He mentioned the example of soil quality issues due to activities such as fireworks. In such a case the monitoring of perchlorates would be imperative, while perchlorates are not listed as priority substances by the EU. Another and related matter concerns timeliness, as our monitoring programmes become more sophisticated and seek to serve national as well as international policy processes, the need for more timely information that might not always match the monitoring cycles enshrined in EU Directives is increasingly becoming apparent.

Conclusion

This paper has sought to outline some of the knowledge gaps currently existing in the field of environmental information, as well as some orientations on the type of assessment, included integrated assessment, that would pave the way for the development of integrated models for policy analysis, which are increasingly required. It is important that these orientations for the future are taken into account when designing the next generation of environmental monitoring programmes. While addressing the major knowledge gaps that still exist, it is important to address also the interlinkages between policy areas, so that key relationships, including spatial relationships, may be identified and addressed. Given these orientations, and the considerations outlined above, it is important that adequate and ongoing resources are allocated for environmental and related monitoring programmes.

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Notes

1. See for example, the EU 7th Environmental Action Programme (DECISION No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' [Text with EEA relevance]).

2. DECISION No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (Text with EEA relevance).

3. Para 73.

4. For example, Balzan M.V. and Bonnici J.J., (2004). Increased prevalence in asthma related symptoms on exposure to heavy traffic. European Respiratory Journal; 24: Suppl. 48, 140s. (cited in Schembri, G. [2007]. Traffic, diesel and asthma: A literature review. Malta Medical Journal; 20: 04). Other work is also in progress, such as the RESPIRA project. Available at: http://www.respira-project.com/ (accessed on 14 March 2014).

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6. Malta Environment and Planning Authority, (2013). Habitats Directive: Report on Implementation Measures. Malta: Malta Environment and Planning Authority. Available

at: http://cdr.eionet.europa.eu/mt/eu/art17/envue53pa (accessed on 10 March 2014).

7. Available at: http://www.mepa.org.mt/biodiversity-projects (accessed on 10 March 2014).

8. Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings.

9. Available at: http://www.um.edu.mt/ben/faculty (accessed on 10 March 2014).

10. Note that the NEP cites the figure for permanent vacancy at 22% of dwelling stock. The 2011 Census uses different categories to describe vacancy, with the result that only the total vacancy rate can be compared with the 2005 figure: in this regard the data indicates that total vacancy increased by four percentage points between 2005 and 2011, from 28% to 32% or from 53,136 to 71,080 dwellings.

11. See for example the provisions for use of models in the 2008 Air Quality Framework Directive – preambular paragraph 6: 'Where possible modelling techniques should be applied to enable point data to be interpreted in terms of geographical distribution of concentration. This could serve as a basis for calculating the collective exposure of the population living in the area.' Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:152:0001:0044:EN:PDF (accessed 13 March 2014).

12. GID Parmenides VI, *ODMED, Observatory for the Development of the Mediterranean, a Tool for Decision makers*, 12-14th November 2013, Valletta University Campus, Valletta, Malta.