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Product Policy as an Instrument for Water Quality Management

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Abstract. A main reason for the persistence of current water pollution lies in the diffuse character of many of its sources. For a large part such diffuse pollution is related to the production, use and waste of various kinds of products. For the reduction of this pollution, a product-oriented policy strategy, based on interaction with stakeholders could be more successful than the traditional measures of direct regulation that were devised for point source reduction. In this article we identify different types of product policy, and explore the potential benefits and costs for water quality management. The methods that can be used in a product policy approach are illustrated with some examples. Although the specific advantages for water quality management have not been quantified yet, governments increasingly recognise the potential positive effects. In this context, the European Water Framework Directive, in stimulating product policy by enhancing public and stakeholders' participation, can be considered to be part of a general development towards interactive water management.

Key words: diffuse sources, product policy, stakeholders, product life cycle analysis, water quality management

1. Introduction

Diffuse sources are among the main threats for water quality in river basins. Examples are nutrients, pesticides, heavy metals and organic matter. Recent awareness about hazardous substances such as many additives (softeners, pesticides, fragrances) to synthetics, cause problems when they escape into the air, fall on the ground and in many cases eventually leak into the water (Barreveld *et al*., 2001). Similar to various residues of medicines, like for example oestrogen (Vethaak *et al.*, 2001) these substances sometimes can work like artificial hormones. Severe contamination appears as a result of combined pollutants.

For the reduction of pollution from diffuse sources, the traditional direct regulation measures devised for the reduction of point sources do not result in the required decrease of pollution. A system of permits and enforcement is too general for emission from products, and is mostly unable to address the sources of diffuse pollution. Product-oriented policy strategies are more suitable for this, although

they also have disadvantages. In the following sections we focus on the potential advantages and disadvantages of product policies in water quality management. We also explore the European regulation with respect to this type of policy. The way the policy process is organised is placed in a broader development towards a more participative style of water management (Van Ast, 2000).

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2. European Integrated Product Policy and the Water Framework Directive

The Water Framework Directive of the European Union (EU, 2000) determines that 'member states shall ensure that all discharges (....) are controlled according to (...) appropriate, Best Environmental Practices.' As far as technical measures are concerned, the directive follows the practices of the Council Directive concerning Integrated Pollution Prevention and Control, or IPPC (EU, 1996). But what are the Best Environmental Practices regarding diffuse sources of water pollution?

In many cases, these practices refer to the way products are produced and used. When governments try to influence product characteristics to reduce pollution, they apply what is known as 'Product Policy.' Oosterhuis *et al.* (1996) define this as '*the policy that intends to reduce the environmental damage of products by influencing the economic actors that deal with them*'. Under the name Product-Oriented Environmental Management or POEM, Bakker and De (2001: 12), describes it as '*a systematic approach to organising a firm in such a way that improving the environmental performance of its products across their life cycles becomes an integrated part of operations and strategy*.' Product policy can be directed towards different aims (Boons, 1995):

- reuse, reduction and change of materials;
- reuse of the product itself;
- substitution of the product;
- substitution by other means of fulfilling the function of the product.

With the adoption of its Green Paper on Integrated Product Policy (IPP) (EU, 2001) on February 7th, 2001, the European Commission had the objective of launching a debate on the role and possible measures that could be taken on a European Union level. Some basic elements of product policy are mentioned here:

- price policy (differentiation in VAT, increased producer responsibility);
- stimulation of demand for green products (quality of technical information, guidelines for ecodesign, implementation of environmental indicators in certification)

– introduction of Product Panels (groups of stakeholder representatives, working together on reducing environmental problems arising from a specific group of products).

With the formulation of the IPP-programme, the European Commission facilitated a number of workshops on particular aspects of Product Policy (EU, 2002]. Here experts and representatives of stakeholders jointly reflected on the implementation of Product Policy. Discussed was for example the making of *Environmental Product Declarations.* These are documents of the environmental characteristics of products, based on an integrated chain analysis. Others were the development of guidelines for *Life Cycle Analysis* and for *Ecodesign* and the introduction of the mentioned *Product Panels*. Another important element of product policy that was discussed is the development of *eco-labels* that offer information about the environmental dimension of a product (EU, 2000).

All these tools of Product Policy heavily depend on interaction with different actors, such as companies and business organisations that deal with products in different ways. According to the EU (2000), the success of the Water Framework Directive (WFD) 'relies on close co-operation and coherent action at Community, Member State and local level as well as on information, consultation and involvement of the public, including users.' Specific instruments and strategies can foster realisation of this urgent need for interaction between the different societal, administrative and political entities in water management. An example is Art. 14, where public information and consultation are mentioned as important elements of the implementation process of the WFD.

In general two main potential advantages of stakeholder participation can be observed:

1. Quality improvement of necessary information. The interaction with involved stakeholders includes their knowledge and critics into the decision-making process.
2. Increase of public support. The exchange of viewpoints between stakeholders could lead to a better understanding of the ins and outs of the specific situation, which could make it easier to accept the final decision.

To profit from these advantages with respect to the environmental measures against diffuse sources, the European Commission invites all relevant stakeholders to put forward their recommendations and opinions. For example, representatives of business organisations and environmental organisations are invited to collaborate in the development of communal water pollution policy. The interactive approach however has significant consequences for the direction of the efforts of water managers, since there are many stakeholders involved in water quality reducing diffuse sources. In the next paragraph we further explore products as a focus for such multi-stakeholder approaches.

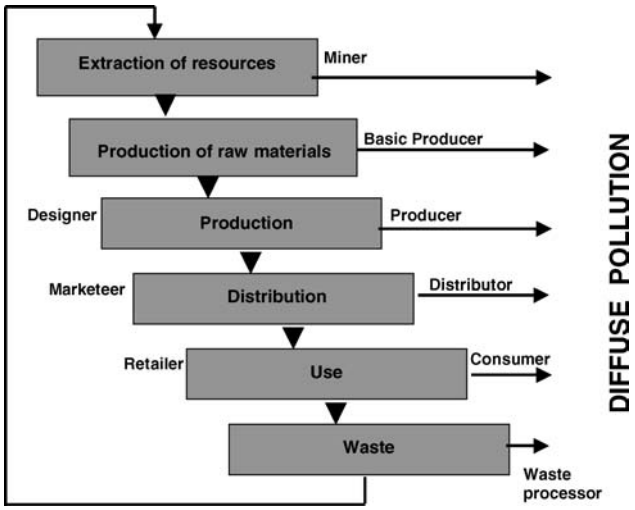

Figure 1. The product life cycle (based on Van Ast and Boot, 2003).

3. Product Life Cycle

The backbone of 'Integrated Product Policy' is the 'Product Life Cycle'. The latter covers all phases in the existence of a product. Starting at the extraction of natural resources, via the production of raw material, through their design, assembly, marketing, distribution, sale and use to their eventual disposal as waste. These phases involve many different actors such as designers, industry, marketing people, retailers and consumers. Figure 1 gives an overview of the different steps a product takes, from its cradle to its grave and the different stakeholders that can be related to these life phases.

Every phase of the product cycle brings another source of pollution. In the past, these sources have been, treated mostly independently, such as improving the efficiency of raw material extraction, or preventing emissions to water from production processes. The theoretical rationale behind a product-oriented approach is that the effects throughout the product chain are looked at in an integrated way. This provides an opportunity to look at spill-over effects. Environmental effects that occur only in the consumption phase may be prevented by changing the production process and its inputs. Huppes *et al.* (1986: 3) concludes that a product-oriented approach is the only one which allows to determine with a large amount of certainty that the advantages of actions to prevent negative environmental effects taken in one part of the chain will not cause other and/or bigger effects somewhere else. This approach thus leads to an integrated, systematic, multi-media approach of environmental effects.

Managing emissions of all of the product phases in an integrated way can stimulate actors involved in each of the different phases to decrease their negative influence on the environment. Historically, the focus on point sources has directed

policy to the phase of 'production' and secondary to the 'waste' phase. More recently, by introducing prevention measures, the phases of 'resource extraction' and 'product design' were included. The 'user' phase, which causes substantial – diffuse – pollution, did not get much attention so far, and certainly not from water managers. But a product-oriented approach has gained considerable momentum over the past 10 years (see also a special issue of the *Journal of Cleaner Production* (Boons and Baumann 2002).

The above-mentioned concepts get more and more attention from business society too (Frankl and Rubik, 2000). In some industrial sectors 'Product Policy' is voluntarily introduced as 'Product Stewardship,' a dimension of the so-called 'Responsible Care' programmes. 'Responsible Care' is a rapidly expanding program for business ethics in chemical industry, aiming at taking social and environmental responsibility as an integrated element of general management. In other words, these companies declare their care for 'People, Planet and Profit.' The consequence of this 'Triple P' approach would have to be that producers deal with the environmental impact of their products in the whole chain of the product cycle; from birth to death. This so-called 'Integrated Chain Management' uses instruments for the calculation of the environmental impact of products. For this purpose, techniques of Life Cycle Analysis (LCA) have been developed. An LCA can be defined as an inventory of the environmental impact of a product, due to all causes in all phases of the product life cycle. LCA is an instrument to facilitate decision-making; it cannot replace it.

4. Advantages of Product Policy for Water Quality

Many potential benefits of product policy have been postulated. In this paragraph we examine these postulated benefits, to assess the extent to which (1) these benefits are also beneficial to water quality, and (2) the actual effects are in line with the postulated ones.

To assess these postulated benefits, we looked into a number of product policy cases with relevance for water quality. They concerned amongst others:

- Washing powders, where phosphates that lead to eutrification have been substituted and discussions are taking place about fragrances.
- Ecological and biological foodstuffs, which contain less of various chemical additives such as pesticides, preservatives, flavourings and colourings.
- Zinc building products, which can be replaced or coated to reduce zinc pollution due to corrosion.
- The TCO (sustainability) label for monitors, that regulates amongst others additives (like softeners) with harmful effects on the environment (so that exposure of the waste should not lead to diffuse water pollution).
- Paints, where traditional alkyd paints on organic solvent basis have been replaced by less harmful water-based acrylic paints (and also the use of toxic ingredients like PAK's and lead is strongly reduced).

With the help of the analysis of these cases, we looked at the extent to which the overall advantages of product policy equal benefits for water quality. The integrated character of the approach is one of the most important postulated benefits. Product Policy by definition addresses all environmental effects, which means that the total environmental impact of a product is taken into account. In this way the transfer of one type of pollution to another environmental problem would therefore be prevented. Although it is true that water pollution would have to be part of any consideration for reducing the environmental impact through product policy, the final effect of such consideration may however be that the prevention of water pollution is made subservient to the prevention of other environmental effects (such as reduction of CO_2 emission). It remains therefore to be seen whether an integrated approach would in all cases benefit water quality.

One example of product policy where the transfer from one type of pollution to the other (i.e. water) did actually take place, is the paint case – see below. In this case, a major environmental and health improvement has been effected by the substitution of traditional alkyd paints based on organic solvents by water-based paints. These improvements concern the reduction of VOS emissions to the air (in relation to smog and greenhouse effect problems) and neurotoxic effects to painters. At the same time, however, emissions of paint waste to the water system have increased.

EXAMPLE 1: The Paint Case

In the properties of paints a real revolution has taken place. Most well known perhaps is the introduction of water-based paints in many sectors. In the Netherlands, it appeared that various cases of the incidental approach towards certain undesired effects of paints led to a more and more structurally embedded product policy. Some conditions appeared to play an important role in this process. One of them is the fact that the paint industry already for a long time had to deal with all types of government interference. At the same time the paint sector was developing rapidly in the direction of a high tech industry in which product innovation became a core activity. Within the sector a limited number of very large players are active and have a disciplining influence on the whole branch of industry. The role of the government is based on a long-term perspective, in which companies can trust on a reasonable amount of predictability in policy. What also helped was that the environmental concern resulted in the same type of conditions as health concern. This was effectively enforced by government regulation and various networks of co-operation supported innovation initiatives.

Another important feature of product policy is that it can be directed towards the earliest link of the product chain. This allows preventative measures at the beginning of the chain that could result in lower impact in the end of the chain. A similar advantage would result from the introduction of broader considerations than just the banning of certain emissions, by for instance also taking into account

different ways to perform the same function (e.g. mechanical instead of chemical cleaning), or possibilities for substitution (from chemical to biological products). In some cases, such types of product-oriented policy strategies can even be considered to be the only reasonable option for the reduction of pollution from diffuse sources. This is for example true when a complete ban on products or substances that pollute the waters in a diffuse way is considered not to be realistic. Another example is when the contribution of the individual product to the total load of contamination is too low for a full ban. It is also possible that the environmental impact is unclear or a product is too important for society. In addition, free market regulation, not in the last place from the EU, can be a too high barrier for a directive approach. The effective advantages for water quality of this widened range of interventions should however not be overestimated beforehand. Addressing different links in the chains or broader issues than just the pollutant itself may often involve heavy costs, serious use of power and battling of conflicts (see also Le Blansch, 1996). A good example of this is the case of washing powders – see below.

EXAMPLE 2: The Phosphate Case

The origin of this case lies in the end of the '60s of the precious century, when it becomes more and more apparent that Dutch surface waters suffer a eutrification problem. Attention focuses on washing powders. The phosphates contained therein are deemed to be an important cause of this problem. Two types of solutions present themselves: substitution of phosphates in washing powders end/or adding a de-phosphatisation step to water treatment plants. Years of discussions and negotiations follow, partly in open societal debate. In 1977, the branch association of washing powder producers propose to reduce the amount of phosphates in washing powder with 40%, which is according to this organisation the highest level that is technologically achievable. This causes enormous societal turmoil, in which also the presumed disastrous effects that severe environmental norms would have on employment become heavily stressed. In 1987, a breakthrough is established when Henkel introduces the phosphate-free 'Green Persil' into the market. Consumers' interest for this alternative is unexpectedly high, which is a major factor in the radical phasing-out of phosphate-containing washing powders.

The type of product policy we referred to above, aiming at specific substances or products, is what we call 'specific/incidental product policy.' We make a distinction between this type and a typically different type of product policy, which we name 'structural product policy.' In this case – that has occurred both in the paint and the washing products industry – structural methods for controlling and reducing the environmental impact of products are embedded in companies' management processes and principles. The benefits for water quality would be that the most fundamental prevention of water pollution is effected through a systematic orientation based on prevention, from the design stage onwards. Also in the case of structural

product policy, however, question marks should be placed concerning the effective results for water quality. Trust and network management come in the place of clear separate responsibilities, checks and balances. As a consequence concrete results of product policy may become invisible or even an article of faith, whereas effective control and measurements may become impossible.

All in all, from a water quality point of view there may be as many objections to product policy as there are postulated benefits. Its real impact will probably depend on the situation and should be judged in practice. This is what we will look into in the next section of this article.

5. Advantages of and Conditions for Product Policy

From the cases that we analysed, we established the specific added value of both incidental/specific and of structural product policy, as well as the conditions under which this added value can be induced (Le Blansch *et al.,* 2002). The TCO case may serve as an extra example of this, next to the two cases that were previously presented.

EXAMPLE 3: The TCO Case

TCO is a Swedish trade union for administrative personnel. It developed, with some help of the Swedish government, a standard with ecologic, energetic and ergonomic conditions for computer monitors. Scientific institutes carried out the objective inspections of the technical conditions of the label. After a period with a reserved attitude of the computer producers, Nokia Industries broke through the unity and designed a monitor with qualities that fulfilled the prescriptions. A fast growing market share was the direct result. This was, amongst others, stimulated by the purchasing power of the members of TCO. The success made many other producers voluntarily enter the TCO label. The label developed by incorporating other conditions and eventually became the global standard for computer equipment.

The cases illustrate the way incidental and specific product policy can be realised and can lead to concrete improvements in relation to diffuse pollution sources. However, the approach may require relatively heavy efforts and severe confrontations within the policy network.

Conditions for incidental product policy to be successful are:

- some of the involved parties recognise a problem;
- these parties can mobilise enough power–through their purchasing power or otherwise- and this power can be deployed efficiently (and is not fragmented or confronted by equally powerful opposing parties);
- these parties do not fear a confrontation;
- there is a perspective for problem solving (in terms of alternative substances, products or functions);

– there is or emerges an innovator on a critical position in the product chain;
– this innovator has or acquires an interest in the innovation.

A structural approach can lead to considerable prevention of pollution with considerably less efforts and less tension within the policy chain (by voluntary action within the product chain). This prevention is, however, not always easily measurable and visible, whereas the required and growing trust between parties can lead to unclear mixes of roles and responsibilities.

Conditions for structural product policy to be successful are that:

– parties take each other seriously and trust each other;
– they have a broader and more long-term oriented vision on environmental and economic interests at stake;
– they have a common–systematic–insight into the problems and technological alternatives that emerge; and
– particularly the more powerful parties embody and radiate a clear and visible commitment to the product policy.

The relation between the incidental and the structural product policies can also be important. Often it shows that a structural policy can only come into being after parties have experienced one or more cases of specific product policy – like was the case in the paint and the washing powders industries. In those incidental cases different parties have shown (or had to show) their teeth and have learnt to take one another seriously. Relevant parties have thus gotten to know each other and have seen what can be achieved through co-operation – lessons that parties can apply in a later stage of structural product policy for establishing whether there is real involvement and real progress.

6. Product Policy and the Role for Authorities

To profit optimally from potential benefits when embarking on product policies, all different stakeholders have to play their specific role, including governmental players. *National policy-makers* in water quality management will have to set the direction for all authorities, either in terms of specific goals in case of specific product policy, or in terms of broad and general perspectives to guide structural product policies. Public *knowledge centres* will have to feed the policy makers and authorities with relevant knowledge, either in terms of specific information on pollution priorities and key players to address, or in terms of more generic instruments and monitoring activities. Regional and local *water managers* have the concrete contacts in the field, which makes them essential for the success of either type of policy. Their responsibility is to communicate developments on the practical aspects to the policy level. *Enforcement agencies* finally have the role of ensuring the application of regulation. They need to have a product-oriented approach and long-term view in their contacts with problematic producers. The Figure 2 below illustrates these roles and relationships.

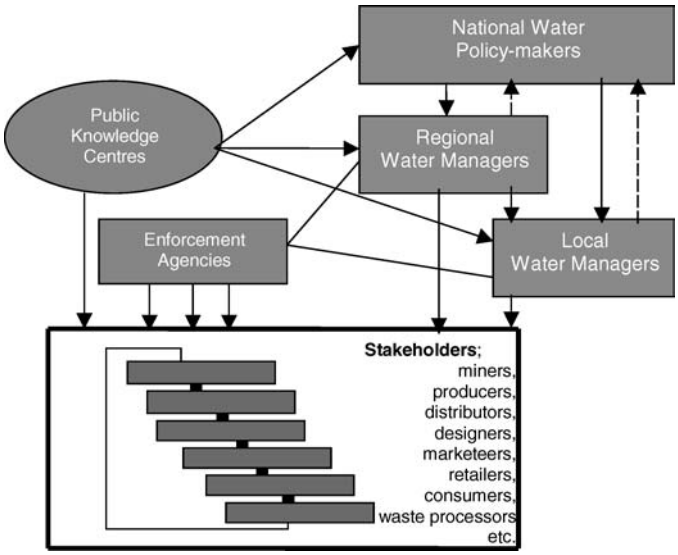

Figure 2. Roles of stakeholders.

7. Towards Interactive Water Management

The basic idea behind IPP and its adoption by the EU (2001) in the Green Paper is that industry is ready to take its own responsibility in solving pollution problems resulting from its activities, including products. The trend from the vertical 'command and control'-paradigm, that allows government agencies to determine from a hierarchical position what citizens should do, towards a paradigm with more horizontal relations between government and stakeholders is obviously present in the Green Paper. More and more government agencies consider this kind of horizontal interaction with stakeholders from business society crucial for the success of new policy implementation (Van Ast, 2000).

When industry takes Corporate Social Responsibility serious, representatives of companies would be increasingly thinking, in interaction with the water managers, about solutions for potential polluting products. To achieve that, the water managers would have to invite representatives of companies that produce products with undesired effects on the water quality. Looking at it this way, characteristics of product policy fit well to a broader trend towards interactive approaches in water management, particularly where product policy of the structural type is concerned (Van Ast, 2000).

What the present EU outline for product policy fails to address, however, is the requirement of a productive interaction between incidental and structural product policy that was highlighted above. For a structural product policy to be effective, learning trajectories, capacity and network building must have taken place, which most often occur as part of a specific product policy event. In sectors and product

chains where these requirements are met, the EU product policy may reinforce already existing policy practices. In sectors and chains where this is not the case, the policy is most likely to remain meaningless.

8. Conclusions

It appears that a wide range of product-oriented policy strategies can be brought under the concept of product policy. Case studies illustrate that product-oriented environmental management could certainly play a role in the struggle against diffuse water pollution. But the implementation of product policy in water quality management can have both advantages and disadvantages, depending on the specific case.

The type of product policy aiming at specific substances or products, '*specific/incidental product policy*' is typically a different type of product policy than what we name '*structural product policy*'. Here, structural methods for controlling and reducing the environmental impact of products are embedded in companies' management processes and principles. From our findings we conclude that an incidental/specific product policy approach can lead to relatively small but very concrete improvements, particularly in relation to diffuse pollution sources. This approach, however, may require relatively heavy efforts and severe confrontations within the policy network. Conditions for success are the existence of powerful motivated stakeholders that do not fear confrontation as a result of the innovative, realistic alternative they can propose.

As far as the structural approach is concerned, it can lead to substantial prevention of pollution with considerably less efforts and less tension within the policy chain. This prevention, however, is not always easily measurable and visible, whereas the required and growing trust between parties can lead to unclear mixes of roles and responsibilities. Here the conditions for success are the existence of some committed, powerful stakeholders with a clear vision on sustainable development, working in an atmosphere of mutual trust.

Particularly the latter type of product policy has in common the interactive approach to the different stakeholders that plays a role in the chains of product life cycles. The way institutionalisation of product policy takes place at EU-level, corresponds with a trend towards more participation in policy-making and emphasises developments towards interactive water management. Thus, many institutional requirements for a strategic embeddedness of structural product policy are met. Whether, however, the more political and cultural preconditions are fulfilled for such policies to be effective, remains to be seen. From our findings we conclude that the fulfilment of these pre-conditions results from learning cycles that are experienced in cases of incidental/specific product policy. Hence, also EU policy will still – and will probably always – need instruments to initiate very concrete and directive interventions to improve products from the point of view of their impact on the environment i.e. water quality.

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