Assessment of the efficiency of the water footprinting approach and of the agricultural products and foodstuff labelling and certification schemes

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Executive Summary

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prepared for

European Commission

Directorate-General Environment

by

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EXECUTIVE SUMMARY

1. INTRODUCTION

This report summarises the findings of research carried out for the European Commission (DG Environment) in preparation for the 2012 review of the water scarcity and drought policy, and the development of a Blueprint for EU water. It is one of a series of related studies, including a review of the first tranche of River Basin Management Plans, the review of water scarcity and an assessment of vulnerability in the context of climate change.

The aim of this study is to help inform the Commission in its development of policy regarding the definition and application of water footprinting and virtual water measurements. This includes considering the use of these tools for both internal EU policy and in relation to EU external water policy. The study also seeks to provide specific recommendations for product labelling and certification schemes relating to the sustainable use of water in the production process of agricultural products and foodstuffs to strengthen the development of the existing EU guidelines on best practice for certification schemes.

2. OBJECTIVES

The overall objective of this study has been:

> "*to provide concrete input into how the use of water footprinting and virtual water measurements, as well as agricultural products and foodstuff labelling and certification schemes, could be reliably used in water scarcity and droughts policy planning and implementation*".

The work carried out in relation to the above objective has been divided into two related Tasks:

- **Task 1 – Virtual water and water footprinting approaches**:
  - review the current applications of water footprinting and virtual water approaches;
  - identify best practice examples of practical applications of water footprinting in policy making from around the world;
  - develop proposals on if and how the water management related information presented by these approaches could be applied in policy making; and

- **Task 2 – Water management related information in agricultural product and foodstuff labelling**:
  - examine the current use of water management related information in food and agricultural product labelling and certification schemes;
  - identify the most suitable schemes for providing information on water use;
  - specify recommendations for certification schemes regarding the efficient use of water resources.

3. APPROACH

Our approach to the study was based upon the two tasks described above, with the work carried out as shown in Table 1 This study comprises two Reports, with this Report (Part A) primarily focussed on actions undertaken under Task 1. The Part B Report primarily focuses on actions carried out under Task 2.

Table 1: Approach			
Task 1			
	Task	**Actions**	**Reporting**
1A	Review the current applications of water footprinting and virtual water approaches	Data Collection, Literature Review and Stakeholder Consultation	Part A Report
1B	Identify best practice examples of practical applications of water footprinting in policy making from around the world	Identification of Best Practice Examples	Part A Report
1C	Develop proposals on if and how the water management related information presented by these approaches could be applied in policy making	Policy Options and Option Groups	Part A Report
		Impact Assessment	Part A Report
Task 2			
	Task	**Actions**	**Reporting**
2A	Examine the current use of water management related information in food and agricultural product labelling and certification schemes	Data Collection, Literature Review and Stakeholder Consultation	Part A Report, Part B Report
2B	Identify the most suitable schemes for providing information on water use	Data Collection, Literature Review and Stakeholder Consultation	Part A Report, Part B Report
		Identification of Best Practice Examples	Part B Report
2C	Specify recommendations for certification schemes regarding the efficient use of water resources	Review of key requirements for a certification scheme	Part B Report
		Review of Minimum Criteria for Sustainable Water Use in Existing Certification Schemes.	Part B Report
		Recommendations	Part B Report

4. WATER FOOTPRINT / VIRTUAL WATER

4.1 Definition

In our opinion, there is no agreement regarding the definitions of "virtual water" or "water footprint", with both being the subject of debate amongst those interested in this field.

The term "**virtual water**" (VW) is generally used to refer to the sum of water used or incorporated in the various steps of the production processes of a commodity. It is mainly used in the context of international trade: a country producing and exporting water-intensive products is exporting water in its virtual form. It has been suggested that international trade could be used to move "virtual water" from comparatively advantaged regions to regions where water is scarce, thereby creating a means for water-poor countries to achieve water security (Allan, 2003). Conversely, such a trade also allows water-rich countries to benefit economically from their natural resources.

The term "**water footprint**" (WF) has been used as a measure of a nation's actual appropriation of global water resources and has been defined as the "*sum of the domestic water use and net virtual water import*" (Hoekstra and Hung 2002). Some studies have used the concept to refer to water appropriation by individuals and other well-defined groups of consumers, (e.g. a city, a region or a state) and producers (e.g. a public organization, private enterprise or economic sector). The WF of an individual, business or nation has, therefore, been defined as the total volume of fresh water that is used to produce the goods and services consumed by an individual, business or nation (Hoekstra and Chapagain, 2004). Somewhat confusingly, the term WF has also been used to describe the VW content of a range of commodities and products (e.g. cotton, tea and bio-energy) summed over their life cycle.

It is generally agreed that both VW and the WF are measures of direct and indirect water consumption and only account for freshwater appropriation. It has been suggested that an important distinction between the two concepts is that a WF "*does not simply refer only to a water volume, as in the case of the term 'virtual water content' of a product*", instead the WF is a "*multidimensional indicator, not only referring to a water volume used, but also making explicit where the water footprint is located, what source of water is used and when the water is used*" (Hoekstra *et al*., 2011).

4.2 Calculation

There are currently three approaches being applied for the calculation of a water footprint:

- **the volumetric approach**, which is based on an assessment of the volume of water associated with a particular production activity;
- **the stress weighted approach,** which is based on an assessment of the amount of freshwater consumed in a production activity combined with an assessment of the implications of that consumption in terms of water stress; and

- **life cycle assessment approaches**, which draw on estimates of water consumption using an inventory analysis similar to that of the volumetric approach but also including an element of impact assessment.

Volumetric Water Footprint Assessment

There are essentially two approaches to calculating a volumetric WF. Process-based or bottom-up approaches use individual production processes as their building blocks to calculate the WF, while top-down approaches use environmental input-output analysis. A key concept in the calculation of a volumetric WF is the 'colour of water'. While most work on VW has considered all water together, most WF work has differentiated between 'Blue', 'Green' and 'Grey' water:

- **Blue water**: surface and groundwater;
- **Green water**: rainwater that is stored in the soil as soil moisture and which is available for the growth of plants; and
- **Grey water**: the volume of freshwater that is required to dilute polluted waste-water to ambient water quality standards.

Some studies have gone further to disaggregate green water into 'net green' water to account for the fact that even without cultivation, naturally occurring vegetation (e.g. forestry) provides a substantial evaporative demand. **Net green,** therefore, refers to the difference between evapotranspiration under cropped conditions and evapotranspiration under natural conditions.

Stress Weighted Approach

A key problem with the volumetric WF approach is that it does not reflect the potential for water consumption to cause environmental harm. In response to this, Ridoutt & Pfister (2009) have revised the water footprint calculation method to incorporate water stress characterisation factors in order to make possible quantitative comparisons between different products and between different stages of a product's life cycle on the basis of environmental impact. The 'stress weighted approach' shares the same concept as the volumetric method but the calculation is slightly different. The two main differences are:

- Green water is excluded based on the argument that its consumption does not directly contribute to water scarcity as green water does not contribute directly to environmental flows and it therefore has a low opportunity cost (Ridoutt & Pfister 2010); and
- Blue water is normalized using global and regional stress factors based on the use of a Water Stress Index (WSI) to normalise water use in the calculation of the water footprint (Pfister *et al.*, 2009). The intention is to create a methodology similar to the way in which characterization factors are used to describe the global warming potential of different greenhouse gases in a carbon footprint.

Water Footprint Assessment as Part of Life Cycle Analysis

The impact of water use in LCA is also based on estimates of water consumption, and an inventory list of all inputs and outputs of water is created for a product or a service, and water consumption is determined from the difference between inputs and outputs. A key difference is that in LCA green water is not normally considered and blue water may be subdivided into many classes according to its occurrence (e.g. surface water/ groundwater) or quality. Grey water is also not included as the impacts associated with pollution are dealt with elsewhere.

Many life cycle impact assessment methods use the withdrawal-to-availability[1] (WTA) ratio for calculating characterization factors, so water withdrawn from a water body that is over-exploited would have a much higher weighting than water withdrawn from an under-utilised water body. However, many other methods are also used to derive characterisation factors and several researchers (e.g. Jeswani & Azapagic, 2011; Berger & Finkbeiner, 2011) have concluded that there is no generally agreed methodology.

4.3 Key Issues

The research carried out for this study has identified several key concerns with regard to the use of water footprinting. These lie mainly with the inconsistent use and application of the competing methodologies and the failure of the methodologies to provide a reliable indicator of the environmental impacts of water consumption. These key issues can be categorised as being conceptual, methodological or interpretation related.

Conceptual issues include:

- the reduction of a water footprint to a single number;
- differences in the distinctions that are made between the different water types;
- assumptions of equality across blue water sources; and
- failure to consider the efficiency of the production activities being assessed.

Methodological issues include:

- a lack of precision in the definition of some components of the water footprint, leading to inconsistent application (e.g. in terms of calculation of gross or net green water);
- a lack of clarity regarding how much indirect water use to take into account (i.e. where to truncate the analysis) and how to account for temporal variability;
- a lack of data, with both the volumetric and water stress approaches relying heavily on data that are often unavailable and/or hard to collect at an appropriate scale. Many studies have used broadscale databases which fail to adequately account for local factors, seasonality of abstractions, annual variations in water consumption, etc. and many have relied heavily on assumptions, estimations and modelling;
- modelling approaches, with different studies relying on different base models of effective rainfall, evapotranspiration and crop use, and water availability and withdrawals; and

[1] The withdrawal-to-availability ratio is the ratio of total annual freshwater withdrawal for human uses in a specific region to the annually available renewable water supply in that region.

- a lack of clarity regarding calculation of the grey water footprint - relying heavily on the definition of water quality standards and subjective judgement, which in turn may lead to non-comparability across different assessments.

Issues associated with the **interpretation of results**:

- use of the term ‘footprint’ rather than account, given that the volumetric approach does not provide a measure of impact; and
- lack of consideration of the opportunity costs of water use and other social, ethical, governance and policy considerations.

Not all authors or stakeholders would agree with the above views and it is clear that businesses have found that the detailed layer of information which is embedded in the composite WF indicator can provide the information needed to develop strategies for more sustainable water use and for identifying risks. This is one of the key drivers underlying corporate interest in the use of these techniques across their supply-chains.

4.4 Applications

Practical experience of undertaking WF assessments is still limited and there are few examples of full WF studies. The assessments have been primarily used by businesses to provide an insight into the largest components and locations of water consumption in the supply-chain; this enables businesses to improve their understanding of associated risks (physical, reputational, regulatory, financial and litigation) and to inform the design of water management strategies, investment decisions and product improvement (WBCSD, 2010).

However, as the methodologies are still at a developmental stage, it has not been possible to single out specific case studies of best practice. Instead, best practice in their use is more linked to approach. In this respect, it could be argued that best practice would involve:

i) WF as an auditing tool to identify areas of greatest water use in the supply-chain; or
ii) WF as a tool for water stewardship to identify which products are sourced from areas at risk of water stress.

To date, few studies have tried to apply water footprinting to water resources planning. Those which do, cover a broad range of scales (international, national, regional, river-basin and local) and have primarily been conducted by research institutions, NGOs and international organisations to try to influence policy indirectly, to raise awareness of issues surrounding water use or to contribute toward the methodological development of water footprinting. At this stage though, it is difficult to identify the most appropriate role for WF methods in water resource planning.

Commodity level assessments have found a broad range of applications, including various household, industrial and energy products. These have been carried out for a range of reasons, but mainly with the aim of raising awareness of the issues surrounding water use and to inform business practice.

5. Further Water Management and Risk Assessment Tools

In addition to the virtual water and water footprint methods discussed in Section 3, it is clear that a second set of tools have been, and are continuing to be, developed with the aim of enabling companies to undertake risk assessments related to their water use, to identify 'hot spots' associated with that use, and / or to aid in the disclosure of water related information as part of business and investment risk management.

The tools that we have identified as being the most relevant to the objectives of the European Commission with regard to better water management and increased water efficiency within the EU and globally are:

- the Global Water Tool developed by the World Business Council for Sustainable Development (WBCSD);
- the Corporate Water Tool;
- the CDP Water Project;
- the Global Environmental Management Initiative Tool; and
- the Water Risk Filter Tool.

These tools are being used at the corporate level and it is clear that efforts are being made to make them more accessible to a wider range of companies – small, medium and large. Greater up-take of their use may therefore be valuable to gaining a greater appreciation of water scarcity issues, the business risks these may give rise to and, as a result, other policy goals in relation to improved water efficiency and more sustainable production and consumption.

In addition, the report by the 2030 Water Resource Group on "Charting our Water Future" (McKinsey & Co., 2009) sets out an approach for more detailed water resource planning with an international focus. This approach is based on economic analysis methods, with the aim of setting out a framework for defining least cost solutions at a cross-sectoral level and identifying the levers to gain stakeholder commitment to such solutions. Promotion of this type of analysis may be relevant in certain EU river basins, but is likely to be equally, if not more, important at the international level as part of global policy efforts to ensure sustainable water management.

Although use of this set of tools is being driven by corporate action and development organisations, there is clearly a potential policy role for the promotion of such tools and assessments.

6. Certification and Labelling Schemes

Certification and labelling schemes for agricultural products and foodstuffs aim to provide assurance that specified production methods or product characteristics have been met. The idea of such schemes is to make the history of products more transparent, thereby enabling consumers to express their environmental and social values through their purchasing decisions. Schemes currently in operation in the EU address a myriad of different issues and function at different stages of the food supply-chain - including the business-to-business (B2B) and business-to-consumer (B2C) level. While some labelling and certification schemes cover a single criterion, many are multi-dimensional covering a range of environmental and/or social criteria.

Certification standards have emerged as powerful tools for influencing both business practices and for responding to consumer preferences. In this regard, two key purposes for water certification have been identified (Richter, 2009):

- encouraging water efficiency or water management more generally; and
- bolstering corporate reputations in relation to social responsibility and sustainability, with this having knock-on effects in terms of attracting investors and gaining new consumers.

It should be noted, though, that the meaning of labels linked to certification is not always clear and that standards differ greatly in terms of their level of quality control. This is one of the reasons why the European Commission makes an important distinction between ‘certification schemes’ which, by definition, necessitate a third-party attestation procedure and those ‘voluntary schemes’ which operate on the basis of a label or logo (often registered as a trademark) without involving any certification mechanism (European Commission, 2010).

An analysis of existing food and agricultural product certification and labelling schemes indicates a dichotomy between schemes with a focus on providing information on the amount of water embedded within a product, and schemes that are focused on encouraging good water stewardship. Labelling on the basis of a water footprint is not currently recommended given the issues surrounding the clarity, transparency and reliability of the single footprint indicator, and its failure to address impacts. Most consumers will not have sufficient background knowledge to interpret the water footprint, and it would be difficult to communicate the concept of a water footprint and the nuances of the data to someone who knows nothing about water footprint assessment. International standards (such as those being developed by the ISO) and agreed methodologies are needed first. Industry has also expressed a concern that, if labelling was to be based on a single indicator such as the water footprint, it is essential that the scope, limitations and meaning are clear to the consumer, otherwise the label will be misleading (CIAA, pers. comm., 2011).

As a result, certification of water stewardship activities would appear to be more appropriate, with this being the focus of a range of industry driven initiatives, both within the EU and aimed at creating a more global certification standard. These initiatives focus on developing an approach to certification that can be applied through a supply-chain, with any accompanying labelling used to promote and support change within the industry, to encourage best practice and to give reassurance that minimum standards have been met.

The Alliance for Water Stewardship (AWS) is developing performance standards which can be used globally to certify water users who voluntarily practice sustainable water management (AWS, 2011). The scheme is being developed with stakeholder involvement and will have stringent standards on water stewardship. It will be aimed at companies that use significant quantities of water in their operations (including agricultural producers, beverage manufacturers, food processors and other food producers) and water utilities. A key aspect of the standards is likely to be the use of tools to measure the water consumption (which may take the form of the water footprint) of interested business and setting standards that reduce the size and impact of the footprint. To qualify for certification, the AWS anticipates that applicants will be required to measure their direct and indirect water consumption along with other physical and chemical characteristics in the local water sheds in which they operate. The AWS is following the ISEAL[2] Code of Good Practice, the aim of which is to ensure that voluntary standards are effective and accessible and bring about positive, social, environmental and economic impacts.

More generally, there is a risk with focusing solely on water use, in that the environmental, social or economic burden of other aspects of the production process may inadvertently be increased. Although it has been recognised that the wider environmental, social and economic effects associated with different food supply-chains are complex and very system specific (Hogan and Thorpe, 2009), policies aimed at reducing water use should also consider these wider effects. Furthermore, consumers will wish to take factors other than just the environment into account when making purchasing decisions (e.g. price, quality, fair trade considerations, etc.). As a result, there may be more value in the creation of a multi-dimensional sustainability label which brings together information across a range of criteria of interest to consumers.

7. THE POLICY OPTIONS

Based on the findings of the above work, as well as consultation with stakeholders, a range of possible policy options was identified for further analysis. These options take into account the general view of most stakeholders that any EU policy aimed at the application of VW/WF at the business or corporate level should focus on 'promotion'. In particular, there appear to be good arguments for promoting supply-chain based initiatives, aimed at identifying key water using links within the supply-chain and addressing particular 'hot spot' issues. At the present time, it is harder to identify a clear role for WF and VW in terms of water resource planning, although there is some limited research underway and a few examples of use in practice. There would appear to be a clearer role for the development of benchmarking data for use by national authorities to help in both regulatory efforts to improve water resource management and in partnership approaches with different industry sectors, including the farming sector. At the international level the outputs of existing studies can be used for the purposes of awareness raising, but there are other assessment methods that may be more relevant to addressing supply and demand imbalances.

With regard to certification and labelling, as discussed above, a range of certification schemes already exist and which could be built upon. Additionally, consultees expressed the view that stewardship, rather than volumes of water used, was a more

[2] The ISEAL Alliance is the global association for social and environmental standards.

important basis for certification and that consumer-aimed labelling would not yet be of value, with a focus on consumer education preferred. The policy options have therefore been limited to promotion and education based activities, with the exception of labelling for certain types of water efficient equipment and some forward looking use of research on labelling.

The policy options are presented in Table 2, together with the types of objectives they ain to achieve. This includes objectives ranging from increasing the sustainability of water use to identifying and targeting research. Note that these objectives were developed for this project and do not necessarily fully reflect the wider objectives of the Commission's water scarcity and droughts programme, nor of the Blueprint for EU Waters.

As can be seen from Table 2, most of the options were developed with the aim of either directly or indirectly increasing the sustainability of water consumption and use, as well as to manage water related risks, although the extent to which they will deliver this is variable and in some cases highly uncertain. To a lesser degree, the options are aimed at improving consistency and agreement across practices by different actors (with this having knock-on benefits with regard to clarity and transparency), and providing better information for planning purposes.

For the purposes of impact assessment, the different options were grouped to take advantage of synergies. This resulted in the creation of five policy groups:

- Group A: Promotion, Education and Partnership (comprising options 1c, 2a, 3a, 4 b, 4c, 5a);

- Group B: Promotion, Education and Analysis (comprising options 1c, 1d, 2c, 3a, 4a, 4b, 4c, 5b);

- Group C: Supply-chain Incentivisation (comprising options 1c, 2a, 4a, 4c, 5a, 5b);

- Group D: Methodology Development – Clarity, Role and Transparency (comprising 1a, 1b and 5c); and

- Group E: Research and Development, Education, Supply-chains and Partnership (comprising 1a, 1b, 1c, 1d, 2b, 2c, 3a, 4a, 4b, 4c, 5b, 5c).

Table 2: Summary of Policy Objectives and Identified Options							
Option	**Objective**						
	Increase sustainable use of water	**Help water users manage water and risks**	**Provide information on environmental impact**	**Improve consistency**	**Obtain agreement amongst stakeholders**	**Provide additional data to reporting and planning**	**Identify and target research**
1a: Defining best practice in water footprint assessment				●	●		●
1b: Funding research on impact assessment in water footprinting			●	●	●		●
1c: Promoting better corporate water management	●	●				●	
1d: Promotion of water use assessments	●	●	●			●	
2a: Benchmarking water use	●				●	●	o
2b: Footprinting as part of integrated planning	●	●			o	●	
2c: Economic productivity assessments	●				o	●	
3a: International Partnership and Support	●			●	●	●	●
4a: Promotion of voluntary certification	●	o				o	
4b: Information dissemination on certification schemes	o	o		o			
4c: Promotion of consumer education campaigns	●						
5a: Establishment of an EC Smart Mark	●	●					
5b: Encourage and monitor voluntary B2B labelling		●	●				
5c: Research on multi-dimensional labelling			●	●	●		●
Key: ● - directly relevant o - indirectly relevant							

8. THE FINDINGS OF THE IMPACT ASSESSMENT

8.1 The Approach

Our approach to the impact assessment started with screening against the impact categories set out in the European Commission's Impact Assessment Guidelines (EC, 2009). From this, 27 relevant impact categories (which in some cases were further sub-divided) were identified and the potential impacts of each policy were assessed against these using a simple rating system (based on five increments ranging from very significant positive change to very significant negative change).

The ratings assigned to individual options were then combined to develop an indication of the overall impacts for each of the policy groups. Synergistic, antagonistic or mitigating effects between options were then considered, alongside:

- the timescale over which the impacts could be felt;
- the geographic scale of the impacts;
- the scale of the impacts in terms of the population affected and who would be affected; and
- whether impacts reflect direct or indirect effects.

A detailed discussion of the findings from the above exercise is provided in Section 7. The main conclusions that can be drawn from this are set out below.

8.2 Environmental Outcomes

Policy Groups C and E are expected to perform the best in terms of delivering environmental benefits from improving the sustainability of water use, increasing the efficiency of water use, and mitigating the impacts of water consumption. These would then be followed by Groups A and B. These findings are driven in part by the emphasis placed on better corporate water management and water stewardship certification within the business-to-business supply-chain on the one hand, and the use of benchmarking across cohorts of businesses and the creation of an EC Smart Mark on the other hand. The international dimension (option 3a) is also important given the importance of managing global water risks and impacts.

8.3 Impacts on Businesses and Authorities

The conclusions regarding the impacts of the different options on businesses and authorities are more complex, taking into account impacts on operating cost, administrative burdens, competitiveness of SMEs versus larger companies and potential increases in the ability to attract investment. In this case, they reflect the fact that promotion of supply-chain initiatives to improve water management, and of water stewardship certification could result in significant operating costs and administrative burdens for some supply-chains, particularly agricultural producers and the associated food and drink supply-chains. As a result, Groups A and D fare relatively better than the other options; in addition, Group A has the potential for improving the relative competitive position of small companies involved in the production of water saving technologies and may help them identify water saving methods and techniques.

Offsetting the potential costs to businesses of the combined sets of actions in Group E and B, are the potential investor-related benefits that may stem from companies having addressed water risks and being able to do this through supply-chain based labelling. However, these larger sets of actions may also give rise to competitiveness issues should small companies be left behind; although the inclusion of promotion and dissemination activities could mitigate this and help ensure a level playing field. International partnership and support is also key in this regard with respect to global suppliers of agricultural and food products, as well as other goods and services, to the EU.

Costs to authorities (including the European Commission and Member States) will arise from promotion and dissemination activities, as well as overseeing and contributing to benchmarking, establishment of an EC Smart Mark and consumer awareness and education campaigns.

8.4 Ease of Implementation

Given that each of the policy Groups involves a series of different actions, it is important to consider whether there are any institutional, capacity or other barriers to their implementation. Clearly, the combined set of options forming Group D would be the easiest to implement as they essentially involve support to existing initiatives (e.g. development and agreement of the ISO Standard on water footprint assessment) and funding of research on impact assessment in water footprinting and on multi-dimensional environmental labelling aimed at consumers.

There should also be few barriers to implementation of Groups A, C and D. In the case of Group C, the greatest difficulties may come from any requirements for economic productivity assessments to be carried out in EU river basins that are essentially water scarcity/drought ‘hot spots’; the remainder of the activities are promotion and dissemination based. For Group A, there may be both capacity and institutional constraints affecting up-take of the options involving the benchmarking of best practice and establishing an EC Smart Mark. Such issues should not arise in relation to consumer awareness and education campaigns, assuming these can be designed to complement the other consumer initiatives undertaken by DG SANCO. Similarly, there are already international initiatives in the field of water and sustainable development which can provide the focus for the types of awareness raising and assessment activities associated with option 3a on international partnership. The sheer number of options comprising Group E make its ease of implementation more complex.

8.5 Risks

This criterion has been included to provide an indication of the potential risks of either not taking the actions set out in the policy Groups or indeed by implementing the different groups.

Group D is considered to pose the lowest risks, in part because it does not require a large number of actions to be implemented. However, it also addresses two of the biggest concerns associated with the current level of activity surrounding the development and application of water footprint assessment. In particular, it is aimed at reducing the risk that such assessments continue to be carried out in an inconsistent manner and that practice becomes fragmented across different user groups and types of applications. Importantly, it also addresses one of the key failings of the current methods, via the incorporation of a strong, robust and repeatable impact assessment methodology.

In comparison, Groups B, C and E are assessed as being more risky due mainly to the increased emphasis on corporate water management, water stewardship certification and associated business-to-business labelling. The concern here is that this may place significant burdens on farm and other businesses and, unless properly targeted and designed, may not deliver the required environmental benefits in terms of improved water management. As Group A provides less emphasis on certification and labelling, it is viewed as lower risk in this regard, while it is still expected to deliver some benefits through the promotion of benchmarking and a Smart Mark, as well as a focus on promoting better corporate water management through the supply-chain.

8.6 Summary

In summary, it is clear that Group D is unlikely to deliver the same efficiency gains as Groups A, B, C and E and, although Groups B and E would both deliver significant benefits, they also have the potential for significant negative effects. Based on the findings of the impact assessment, policy option Groups A and C would appear preferable as they both deliver significant benefits without the potential for significant negative effects. In this regard, Group A is likely to perform slightly better (this is largely due to the inclusion of policy option 3a within Group A). Although Group C would probably provide a slightly better environmental outcome than Group A, Group C is viewed as posing slightly higher risks, with greater potential for negative impacts on businesses and authorities due to a greater emphasis on certification and labelling. We consider that the additional benefits in terms of environmental outcome and ease of implementation that would be derived from implementing Group C (rather than Group A) would not compensate for the additional risks and impacts on businesses and authorities that would be derived from implementing Group C rather than Group A. On this basis the policy options combined to form Group A appear preferred. These are:

- Promoting better corporate water management (option 1c);
- Benchmarking best practice in water use (option 2a);
- International partnership and support in the area of sustainable development (option 3a);
- Information dissemination on certification schemes (option 4b);
- Promotion of national consumer education campaigns (option 4c); and
- Establishment of an EC ‘Smart Mark’ for water saving technologies (option 5a).

9. CONCLUSIONS

Water scarcity is not only an issue for the EU but is a global concern. This stems not only from the potential impacts of scarcity on the environment, but also the wider risks to businesses and national economies in terms of food security and the sustainability of their production activities.

Although water footprinting has been valuable in raising awareness over the need for sustainable water consumption and the extent to which countries export or import water as part of international trade, its current role is probably best viewed as a tool for corporate supply-chain management. Even in this respect though there are issues regarding a lack of consistency, clarity and transparency with the use of the methods that need to be addressed. As a result, care should be taken in promoting its use more generally, and especially as a tool to support agricultural products and food labelling, until some of these issues are resolved.

There are an increasing number of initiatives globally aimed at developing certification standards for application across commodity supply-chains. Given the inclusive approaches being taken to develop these standards, it may be more appropriate for the European Commission to support such efforts than to put forward its own 'best practice' recommendations.

It is clear from the analysis conducted here that the Commission could pursue policies based on the promotion, education and partnership of water footprinting that could help to reduce water related risks, with benefits for the environment, businesses and national economies.

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