RDS Smart Climate Series:

WATER QUALITY AND IRISH AGRICULTURE

Research and Knowledge Exchange to bring about positive change

Welcome

Cathal O'Donoghue, Chairperson of the RDS Foundation Board and co-director of the WaterMARKE research programme welcomed everyone to the conference on water quality which is part of the RDS Climate Smart Agriculture series. The WaterMARKE project was undertaken by Teagasc and the University of Galway to understand some of the economic and behavioral drivers of water quality and that the project is funded by the Environmental Protection Agency (EPA) and the Department of Agriculture, Food and the Marine (DAFM). Prof O'Donoghue outlined the challenges that water quality has faced in Ireland and the

links between water quality and agriculture, requiring continued research and improvements on farms to improve overall water quality.

Local information is key - Teagasc Director Prof. Frank O'Mara

The first speaker, Teagasc Director Professor Frank O'Mara, spoke about the importance of water quality and the need for the provision of localised, tailored advice to farmers to improve water quality. He goes on to reference the Agricultural Sustainability Support and Advisory Programme (ASSAP), which is run by Teagasc in collaboration with Co-Ops and dairy processors, and the work they do to improve water quality. He pointed out that this is done by listening and working with farmers at a grassroots level which he believes is key to improving water quality on farms.

'Improving water quality is a complex problem' - Dr. Mary Ryan

There are many complex scientific factors that influence how human activities impact on water quality, particularly in relation to agriculture, according to Dr. Mary Ryan (Teagasc), the WaterMARKE project co-ordinator. She reminded the audience that as individuals, we all contribute to water quality issues, as every time someone uses a toilet, a shower or dishwasher they are putting pressure on water quality. Dr Ryan gave an overview of the upcoming speakers and the different areas impacting water quality and outlined how the WaterMARKE project focused on the types of activity that lead to dis-improvement in water quality, how to mitigate losses to water through drainage systems and the costs of a range of mitigation measures, along with behavioural studies that revealed factors that could positively or negatively influence greater adoption of water quality mitigation measures.

Key drivers of poor water quality are human population, livestock numbers and septic tanks - Dr. Yuting Meng

Dr Meng reviewed recent water quality analysis, and the spatial relationship between water quality status and agricultural activities. She explained how the analysis examined each stage of water quality from a national to a local level. There are different drivers of poor water quality depending on the region, according to Dr Meng. The key drivers however, are agricultural activity, population density and septic tanks, however, local soil and environmental conditions can make it difficult to isolate the relative impacts of different drives of water quality decline.

Showing a GIS map as part of her presentation she highlights that better water quality is associated with areas with low agricultural activity and population density. Dr Meng shows that water quality has declined in many areas in recent years in tandem with a rise in human population density and livestock numbers in certain areas.

Her slides show that although environmental efficiency gains have been maintained, the increase in animal numbers is likely to have pressure on water quality. The next step will be to review and use drivers of water quality change in more localised models, to get more nuanced information.

Innovative approaches to examining the cost-effectiveness of water quality measures at individual farm level - Daniel Urban, PhD Walsh Scholar

As the impact of agriculture on water quality is localised, modelling tools for agri-environmental policy analysis need to address the spatial variation of agricultural intensity and production systems in local areas. Agricultural Nitrogen load per hectare is one of the factors of economic activity that is commonly used to represent the intensity of agricultural

activity and farm-level response to N mitigation measures in local areas i.e. sub-catchments. The economic structure of farming is also unique to local areas, thus understanding this diversity is necessary to design appropriate sets of environmental measures for specific local areas.

Different water quality impacts for different farms

Urban looked at the cost-effectiveness of measures for individual farms and found that the sub-catchments in which farms are located is an important determinant of both the quantity of farm Nitrogen load and the cost of individual mitigation measures. Reducing nitrogen fertiliser by 20% is more efficient than 10% in areas where nitrogen usage is higher. In relation to increasing dairy cow breeding indices, if each cow could produce more milk, then fewer cows would be necessary to satisfy the current demand. Assuming that the nitrogen excreted per cow stays the same, this measure both reduces N-load and saves money across all farms. However, he points out that other methods such as fencing watercourses to prevent livestock access would be more effective to support good water quality in other areas.

Farmer peer pressure and the impact on water quality - Niall McLoughlin, ASSAP advisor with Lakeland Dairies

The adoption of “win-win” measures to help the environment and farmers is unfortunately low, according to Niall McLoughlin. In his Master’s thesis, he uses the Theory of Planned Behaviour and the farm and farmer characteristics of individual farmers to reveal why different farmers are likely to adopt specific water quality improvement measures and others are not. There are four main drivers:

- Beliefs and attitudes (positive or negative towards environment)
- Subjective norms (acceptability of measure by other farmers/trusted sources)
- Perceived behavioural control (does the farm have the required knowledge, time)
- Cost barriers (extent of direct and indirect costs associated with measures)

Analysis of a survey of 1,009 farmers in late 2017 found that peer acceptability and farmer know-how are really important in terms of addressing or changing farmer attitudes. The study also found that the intention to remedy water quality issues on farms can be eroded by perceived cost barriers. He concluded that if measures are to be win-win for both farmers and the environment, policy and advisory agents should focus on the subjective norms, know-how and cost attributes of individual measures.

Take home messages

The take home message for policy makers is that peer acceptance (of undertaking water quality measures) is a real driver and therefore initiatives such as discussion groups can be very important in influencing farmer behaviour.

Part Two

Characteristics of farmers taking up water quality measures - Dr Paula Cullen

Looking at the characteristics behind the uptake of water quality measures, Dr Paula Cullen of Teagasc asks two main questions. These are:

1. What types of farms are adopting measures?
2. What type of measures are adopted?

She outlines that the information she has used comes from ASSAP, which has 43 advisors across the country. As part of their work they've found that 89% of farms involved in the project have taken up at least one measure to adopt issues regarding water quality on their farms.

A surprise finding in the research was that it wasn't expected that the higher level of knowledge needed would result in a higher uptake of a measure. However, it was reasoned

that advisors spend more time explaining a complicated issue which resulted in more knowledge and understanding being passed to the farmer.

Overall, it was found that it was difficult to mainstream advice as each farm could have specific and different issues.

In terms of the characteristics of farmers who were likely to take up measures, it was found that dairy farmers, agri-environment scheme participants and farms with higher number of issues were all likely to be adopters. Conversely, it was found that larger farms were less likely to be adopters.

Farmers are 'most targeted population' when it comes to water quality - Rossella Di Domenico, PhD student with University of Galway and Teagasc

Farmers feel they are the "most targeted population" when it comes to addressing water quality measures, according to psychologist and PhD student Rossella Di Domenico. Her behavioural psychology research developed a number of questions that were put to agricultural advisors and farmer,s based on a bottom up approach.

Trust is key

The level of trust between farmers and advisors was raised and advisors say that time is needed to build trust between the two. The social pressures and age of farmers were raised as part of the barriers to farmers engaging with pro environmental water quality behaviours by advisors.

There was also some disagreement between farmers and advisors as certain farmers felt they had enough knowledge and interest to act on pro-environmental water quality behaviours, but advisors did not.

However, overall it was found that the farmer-advisor relationship was bi-directional which means that the onus should not just be on farmers but other stakeholders, including advisors when it comes to transferring knowledge about water quality.

Influencers need to work together to improve water quality - Prof Mary Ryan, Teagasc and WaterMARKE co-ordinator

Innovation eco-systems are being used by Dr Mary Ryan and her team to look at the 'ecosystem' of agents and incentives/disincentives that are influencing farmer's behaviour in relation to water quality. Everyone from policy makers, farmer representatives to processors are considered as actors in influencing farmer behaviour. She considers not just the presence of the actors in the system but their effectiveness in influencing farmers.

While it was noted that everyone was working hard, not everyone was "working together". It was observed that a more localised approach to addressing water quality was needed.

No more 'top down' approaches

In summary, Dr Ryan considers what has changed since 2018 and points out that there are many initiatives to reverse the 'top down – one rule fits all' approach, with more nuanced regulation and a range of more collaborative approach between farmers and advisors, particularly with ASSAP and LAWPRO and a number of Locally Led projects. However, there is still a long way to go to mainstream better understanding of the water quality issues and how they are best addressed, outside of priority areas.

Despite the complexity of the science, many of the mitigation measures are not complex or costly to implement. Those that are need to be supported financially or in terms of providing the necessary knowledge. Greater financial and knowledge supports would in themselves develop stronger positive farmer norms around water quality mitigation measures.

Discussants and their comments on the presentations

‘Crude’ policy needs to be addressed - Prof. John Curtis

In reviewing the WaterMARKE research, Prof. John Curtis, from the Economic and Social Research Institute (ESRI) points to similarities between an earlier presentation in the conference and another research paper published by ESRI in 2002, with regard to water quality. However, he says that the science has changed significantly since then. He points out that although the conference is focusing on the role of agriculture in water quality, that there needs to be a whole catchment approach to addressing poor water quality issue.

“If everything was hunky dory, we wouldn’t be here talking about it today”

Curtis also highlights that there are issues in terms of the policy being clearly ineffective in addressing water quality on farms, otherwise this discussion wouldn’t be taking place. He blames the national rather than local approach of policy, and describes national policy as “crude”. Policy and behavioural attitudes need to be addressed in a meaningful way and he says that ASSAP is the first step.

Ger Shortle, Teagasc Regional manager

Measures that are the ones most likely to be taken up seem to be the ones that are the most visual for farmers, observes Ger Shortle (formerly Agricultural Catchments Programme lead). He gives an overview and his thoughts on the presentations that were given during the conference.

Nitrates and water quality issues on farms are “front and centre” in the South East where he works. Shortle feels that the relationship between farmers and their influencers isn’t just bi-directional, as was mentioned previously but multi-directional. He says that a collaborative approach between all the drivers, including farmers, is needed and that that is where the real “long-term gains” can be made.

Dr Anthony Cawley, Department of Agriculture, Food & Marine

The difference in opinion between farmers and advisors, highlighted in the presentation by psychologist Rosella Di Domenico, is noted by Dr Cawley. He says that more ommunication could be encouraged on the back of this finding.

Overall, he says that behavioural research is “absolutely critical” in understanding what drives farmers and the uptake of measures. In conclusion, he says that the message that one-size-fits-all has been taken on board by the Department of Agriculture when it comes to making policy changes.

Dr Kevin Heanue, Teasasc Evaluation Officer

Information up until recently was based on mapping the issues around water quality rather than diagnosing them, according to Dr Heanue. He says that recognising the key points that help to make decisions on farms is very interesting and an approach that can continue to yield results.

He also highlights the role of “exnovation” and unlearning habits, which can be important for progress.

Conclusion: Prof Cathal O'Donoghue University of Galway & WaterMARKE Principal Investigator

"Water quality is a really important policy question as we try to return water quality to the way it was," according to Cathal O'Donoghue as he concludes the conference.

He thanks the funders (EPA and DAFM) and says that the work they are doing together is "brave" but that to deal with the problems of the future requires all actors to work (better) together. He reiterates that water quality problems are local and that the solutions are also to be found at a local level.

The work of ASSAP is commended by O'Donoghue, including their knowledge and professionalism. In terms of policy, he points out that there still needs to be changes in policy but that it has moved and shifted over the years and as policy continues towards results based schemes, more can be done.

He also highlights that the word "trust" has been repeated in a number of presentations and that this is an important element in terms of delivering results at a local level. In wrapping up, he acknowledges the work of Dr Mary Ryan and the WaterMARKE team.

In summing up, Prof O'Donoghue re-iterates that improving water quality is an extremely difficult challenge and is probably more difficult that biodiversity or greenhouse gas emission improvements. From a policy perspective, this complexity poses significant administrative, technical and political challenges, given the uncertainty between advice, resourcing and delivering outcomes. As a result, regulations are relatively conservative and broad-brush, given the lack of availability of detailed data on the impact of agricultural practices on water quality, such as that generated by the Agricultural Catchments Programme for a range of catchment types. Such information, although costly to collect, would allow for greater targeting of regulation and of incentives and the provision of more nuanced advice to individual farmers.