Specialist Group on
DIFFUSE POLLUTION

July 2016

Editor: Brian D'Arcy brian@enviroexperience.co.uk

Committee oversight: Ralf Kunkel, responsible for communications strategy, and Fiona Napier (Secretary). Activists to help as assistant editors are invited to offer material for the next (winter, January 2017) issue. Contributions from anyone are welcome!

MESSAGE FROM THE CHAIRMAN

It is my great pleasure to write my first message for our newsletter as the new chair of the Diffuse Pollution and Eutrophication Specialist Group. I am very much honored to be the 7th chair in succession to past chairs of the group. Since Emeritus Professor Vladimir Novotny created the Diffuse Pollution Specialist Group and held the first conference, in Chicago, USA in 1993, we have had our 17th international conference, which is the evidence of the success of our group. As I write this, I went back to the past newsletters to recap our history and would like to quote: "the IWA acknowledged our group as particularly active, constructive and progressive group" in 2010 issue. I recall how enthusiastic the committee was about reviving our group activities to make the group thriving at the meeting in the most recent conference in Berlin in September 2015. We shall ensure the continuity of our success in the past with new leadership into the future.

Diffuse pollution is of great concern worldwide. As you might heard, the recent water crisis in Flint, USA, its drinking water was contaminated with lead due to corrosive water from Flint River after the process of its highly polluted water. While the primary pollution source was industrial wastewater discharge, diffuse pollution from rural areas and landfills, etc. also contributed to the pollution especially during heavy rain and snowmelt. As we live in the era of climate change, we are facing new global challenges such as water security, water/food/energy nexus, and climate change adaptation in association with diffuse pollution problems. With my own over 12 year involvement with the group, I have observed that the group has grown, also merging with the Eutrophication Specialist Group in 2006, which broadened the group's scope and role. Now we should reshape our vision, and direction to cope with the global challenges (This may require amending by-laws if needed after the recent modification in 2010). My perspective of our group is a dynamic, inter/cross/multi-disciplinary, inspirational, forward-thinking group with experts who are anxious to tackle these global issues. We shall be keen to use every opportunity to work with one another within the group and collaborate with other IWA Specialist Groups and in the wider water community.

Most of all, I would like to thank all the past chairs, officers and committee members for their efforts and contributions. I would greatly appreciate all of your advices and suggestions from your experience. I should be thankful for all current committee members as well as those stepping down last year. I also want to thank a former secretary, Dr. Brian D'Arcy, for offering to edit our newsletter, which has been dormant since 2011. I want to welcome our new secretary, Dr. Fiona Napier, and thank our treasurer, Prof. Xiaoyan Wang for agreeing to continue in that important role. I am excited that we now have the first women officers throughout the history of the group, which is another step forward with diversity within the group leadership. We have reorganized working groups and I would like to thank new working group leaders and members who volunteered for their commitment. Now we are in the process of

electing a new vice chair.

I would like to solicit your active participation in group activities especially our conferences as we need your help and contribution to promote our group activities and make them successful! We will also welcome your suggestion and input to increase the visibility of the group and develop our strategies and directions for future tasks. According to our group record, our committee used to have up to 24 members and now we have only 14 members. We are currently looking for new committee members from all countries, especially underrepresented regions such as Africa, Middle East, South Asia and North and South America to ensure global representation as much as possible. If there is anyone would like to contribute to the committee, we will welcome you. I would like to encourage nomination of a new member or yourself who are active in the field and enthusiastic for being involved in our activities including our conferences and meetings. The committee members will be elected for a four-year term, extendable for another term. We are also seeking for more participation of young professionals, who will be the future of our group. Please feel free to contact our secretary, Fiona Napier or me for nomination or any questions. Prove your interest by writing for our newsletter; contributions welcome!

For the most recent international conference, I would like to thank the organizers including Prof. Dr.Tockner, on the behalf of the group for such a wonderful event. In particular, I should give special thanks to the conference chair, Prof. Markus Venohr, for his leadership and great work. Despite all the challenges to host the conference of this type as a new committee member, he did an excellent job! In addition, my thanks go to all the reviewers, the session chairs and all the participants for their work and contribution. Thanks for all the committee members for their support for the Berlin conference to get over their hardship.

Regarding upcoming events, we are already looking forward to the 18th international conference in Los Angeles, USA in 2017, which is organized by our committee member, Prof. Michael K. Stenstrom. This year, we are eagerly anticipating the IWA Regional Conference on Diffuse Pollution and Catchment Management in Dublin, Ireland in October 23-27, 2016. This, our second regional conference after the success of Lake Biwa in Japan in 2014, is organized by one of the past chairs of our group, Dr. Ray Earle (Conference Chair) and Prof. Fiona Regan (Scientific Committee Chair). Another event in this year is the IWA World Water Congress that will be held in Brisbane, Australia in October 9-14. I would like to thank Prof. Leehyung Kim for his effort in organizing a workshop for our group. The Committee is due to meet in Brisbane as well as in our regional and international conferences. I would like to encourage your participation in these conferences. You will find further information about these conferences in this newsletter.

For future events, we are calling for bids to host the 19th international conference in 2019 and regional conference in 2018. We are seeking bids from any region or country. I understand organizing a conference is hard work and yet extremely rewarding. We will welcome and look forward to receiving your bids for both conferences and possibly future events in 2021 (international) and 2020 (regional).

In addition, congratulations on an upcoming publication on "*Wealth Creation Without Pollution – Designing for Industry, Ecobusiness Parks and Industrial Estates*", by Brian D'Arcy, Lee-Hyung Kim and Marla Maniquiz-Redillas (eds.). It has been a long time coming to fruition following discussions and workshops since 2009 Seoul conference. This is an important way to disseminate our state-of-art knowledge and we should plan more in the future. Our next publishing project is the Land Use and Water Quality report (see details in this issue of the newsletter).

Finally, communication is key to keep our group being successful. The officers and I will guarantee active communication and transparency of the procedures. While we are open to your suggestion to boost our communication and outreach, we currently have several ways for our communication. The IWA launched Connect Website to share information within and outside the group. (Please note that the IWA decided to decommission WaterWiki by the end of June, 2016.) I hope that you have a chance to visit our group Connect website. We will use the group Connect website to advertise our group activities and to attract more people in the water community. The officers will also post all our materials to the Connect website for your information. If you have any suggestions or inputs for our Connect website, please feel free to contact our secretary, Fiona Napier, newsletter working group leader, Ralf Kunkle, or me. Our newsletter is another important medium to "diffuse" our news and information within the group and IWA network. I would like to encourage you to share the group newsletter with your colleagues and peers, and contribute to articles and news writing as we cannot keep publishing our newsletter without your input.

I am looking forward meeting you in Brisbane and Dublin in the fall and wish you all the best.

Mi-Hyun Park
The Chair of the IWA Diffuse Pollution and Eutrophication Specialist Group

MESSAGE FROM THE SECRETARY

In this issue of our newsletter, we have a variety of interesting articles, and news of the forthcoming IWA and other events and activities which should be of interest to anyone interested in diffuse pollution and addressing the challenges it presents. The news item on San Francisco Estuary highlights the exciting work being done by the San Francisco Estuary Institute (SFEI) and is an indication of the great wealth of interesting activities and research in California. Our next DIPCON event is of course in Southern California, organised by Prof. Michael Stenstrom at UCLA. Before then we have an exciting regional conference in Dublin (23rd to 27th October, 2016), led by past chair Ray Earle and Prof. Fiona Regan of Dublin City University, and it will be a fun and worthwhile conference as we have come to expect from Ray and his co-hosts in Ireland.

I am keen to reiterate the call for bids to host our next DIPCON events, the Biennial International Conference on Diffuse Pollution and Eutrophication, which are scheduled for 2019, 2021, 2023. All are available at present. Contact us if you are interested or have questions before making an expression of interest.

Finally, in this issue we are launching an idea we hope might become a regular item: please send us your photographs of diffuse pollution problems or measures in place in your country, or places you have visited, with permission for us to publish here and a short caption (1-2 sentences explaining what the photograph shows and where it is). We just want to have a page each issue which shows the international span of our interests and activities, and offers an easy way to be a bit more involved with the group; have a look at the examples inside this issue and send us your contributions! One opportunity is to supply a photo of a site where you have undertaken research and add the reference beneath it. But anything of interest will be considered and gratefully received.

Fiona Napier,
Secretary

(Editor's note: as we go to publication, we have received an expression of interest to host the 2018 Regional Conference in Thailand.)

REPORT FROM THE TREASURER

The following statement has been received from IWA and is to be confirmed in the next Newsletter in January 2017. The balance in the IWA Account held for the Diffuse Pollution and Eutrophication specialist group is 21939 EURO.

Xiaoyan Wang and Hong Li

NEWS OF IWA AND THE GROUP

Diffuse pollution at the IWA Biennial World Water Congress & Exhibition, Brisbane, Queensland, Australia 9-13 October 2016

This year, the IWA World Water Congress (WWC) will be held in Brisbane, Australia from 9-13 October. This is *the* global event for water professionals, and draws over 5,500 of the top water, environment and related professionals from more than 100 countries from across the water sector.

IWA has 49 specialist groups, covering a broad range of water-related scientific, technical and management topics and providing great opportunities for international networking and collaboration. The WWC offers a unique opportunity to engage with professionals across the water spectrum, and *all* the specialist groups will be represented – an excellent opportunity for cross-topic interaction!

In addition to the main scientific-technical sessions, a programme of themed workshops is planned, providing the opportunity for more participatory engagement between delegates on current hot-topics. The Diffuse Pollution Specialist Group (DPSG) will be co-hosting a workshop led by Prof Lee-Hyung Kim, a committee member of the Diffuse Pollution Specialist Group, on 13th October (13.30-15.00): *Managing diffuse pollution to improve water quality through low impact strategies (ID BW31)*.

At the same time (unfortunately!) another workshop that will interest diffuse pollution specialists has been organised in association with UNEP, the United Nations Environment Programme *Protecting Wetland Ecosystems from Water Quality risks (ID BW32)*. It is being co-organised with UNEP, with help from the UNEP-DHI Partnership, lead organisers Paul Glennie and Carolina Latorre.

There is of course a lot more going on and great opportunities to meet and network: http://www.iwa-network.org/event/world-water-congress-exhibition-2016/

Fiona Napier & Lee-Hyung Kim

Regional IWA diffuse pollution conference, Dublin, Ireland 23-27 October 2016

IWA Regional Conference on Diffuse Pollution and Catchment Management will take place in Dublin City University from October 23rd to October 27t, 2016. The conference will be hosted in conjunction with the International Water Association (IWA) and DCU Water Institute. DCU Water Institute specialises in technological developments across science, engineering and computer science domains with a strong communications focus, as well as policy and business drivers to help solve water-related problems.

Dublin City University is proud to host the IWA Regional Conference on DPCM 2016, welcoming delegates from around the globe to enjoy its "Céad Míle Fáilte"— a hundred thousand welcomes. The

city, originally founded as a Viking settlement, has gone through many transitions and is presently one of the major cities for industry and sciences, with a rich historical past. Though an historical city, it's the youth and vibrancy as the capital of Ireland which offers so much to its visiting delegates. Within Dublin, there are many sights to see while exploring the city by foot. From the museums, galleries, shops, restaurants and bars, Dublin offers each visitor a multitude of options to suit their needs.

As we know, water is a global challenge with traditional pressures still very much on the agenda and emerging issues driving new research topics in the search for solutions. We very much welcome scientific contributions spanning the many traditional areas, as well as new innovative topics addressing diffuse pollution and catchment management. The IWA Regional Conference on Diffuse Pollution and Catchment Management target audience of delegates and presenters will include individuals from academia and research institutes, environmental agencies, consultancies, government & political organizations, and industries across the spectrum of water management.

The main themes to be addressed in the conference include:
■ Diffuse pollution impacts
Governance and Policy
■ Business Models and Financing
■ Value of Citizen Science
■ Water Literacy
■ Meaningful Stakeholder Engagement
■ Emerging and Innovative Technologies
■ Green Solutions
■ Integrated Catchment Management
■ Storm Water Management
■ Critical Pollution Source Areas
■ Climate Change Adaptation
■ Ecosystem Health
■ Micro and Nano Plastics
■ Internet of Things
■ Water Food Energy Nexus
■ Agriculture in the context of Food Harvest 2020
■ Modelling and Forecasting

We are delighted to have a breadth of expertise and knowledge in our three parallel sessions over three days. Each day will be kicked off by stimulating plenary talks. The details of these can be seen on the conference website. In addition we have over 20 wonderful keynote presentations comprising national and international perspectives on topics relating to diffuse pollution and related impacts. We have the pleasure of offering a wide range of interesting workshops being led by experts who have developed programmes with stimulating ideals for discussion. We welcome participation in our workshops and parallel sessions. These will give you plenty of scientific content on topics of catchment management, new innovations for water treatment, emerging policy issues and stakeholder engagement to name but a few, that will help you enjoy our rich social programme just as much as the scientific one. Please visit our website for further details. We look forward to welcoming you to Dublin in October.

For further information regarding the conference, please visit: www.dpcm2016.com or
contact us via email: dpcm2016reg@keynotepco.ie

The IWA International Conference on Diffuse Pollution and Eutrophication, Los Angeles: DIPCON 2017

At the October 2015 committee meeting of the Diffuse Pollution and Eutrophication Specialist Group, at the Berlin DIPCON, a proposal to stage the next DIPCON, in 2017, was presented by ***Prof. Michael Stenstrom*** of UCLA. It was formally accepted and further details are awaited. It will be the group's fourth Biennial Conference, DIPCON 2017 and continue the long history of international conferences since the group was founded in 1993. Provisional dates are 13-17th August 2017, but not yet certain.

The first international conference of the Specialist Group was held in USA in Chicago in 1993, and the group returned to USA in 2001 for the conference in Marquette University, Milwaukee. A return to USA in 2017 is certainly not before time!

DIPCON 2017 is anticipated to feature all the research themes and practitioner issues which will make it an invaluable experience, in a memorable location. One important theme which can be mentioned now is Diffuse Pollution Impacts (see main feature article). Papers are sought in support of the initiative of the Specialist Group to develop up to date evidence on the importance of the issue, to be the factual basis for an IWA sponsored *Land Use and Water Quality Report* in 2019. As well as current research, this needs to include review papers on the following aspects:

a) High level state of environment reports, estimating national extent and severity of diffuse pollution impacts on the water environment
b) Ecological impacts – case studies & reviews
c) Resource impairment and economic impacts – case studies & reviews
d) Water utility impacts – business costs and risks

More information and a broader call for papers will follow from the conference organisers soon, and feature in the January 2017 Newsletter.
Contact: www.iwa-network.org/all-events/

The IWA magazine: *The Source*

The magazine is well established now, regularly featuring material which is fresh and thought provoking. IWA's new magazine, *The Source* is being published quarterly and will continue to be an important source of information about issues such as diffuse pollution, and the broader spectrum of water issues addressed by IWA. Contact: editor@thesourcemagazine.org

FEATURE ARTICLE

IWA *Water Quality and Land Use Impacts Report*

Diffuse pollution encompasses is a very broad variety of issues, which inevitably leads to narrower detailed interests by researchers and policy leaders. That is sensible for studying phenomena related to specific aspects of course. But there is a common string of phenomena unifying diffuse pollution as a

very useful concept, whether looking at urban runoff or agriculture or forestry, or developing control strategies for protecting recreational waters from faecal pathogens:

- Weather-driven pollution
- Contamination from land and directly related to land use and activities
- Importance of permeability and interface with groundwater
- Collective impacts across a catchment
- Landscape sinks or transformations of pollutants and how that can be influenced.

A narrowing of collective focus also risks a narrowing of opportunities for successfully advocating the broad land use and other measures which evidence indicates are necessary elements in management strategies. One of the most important reasons for a broad recognition of diffuse pollution is to persuade governments and environment agencies that it is the biggest remaining pollution challenge in developed countries, and also seriously impacts many developing countries too. That argument won't be won by a regulator concerned only about an insecticide in a stream in southern Germany, or a Dutch scientist talking only about phosphorus. It is hoped in this initiative, to raise awareness of the interrelated issues, and open the eyes and ears of politicians and policy leaders to the facts about environmental pollution of the water environment and associated ecosystems. The issues behind this initiative will be explored in Workshops in Brisbane and Dublin respectively in October this year.

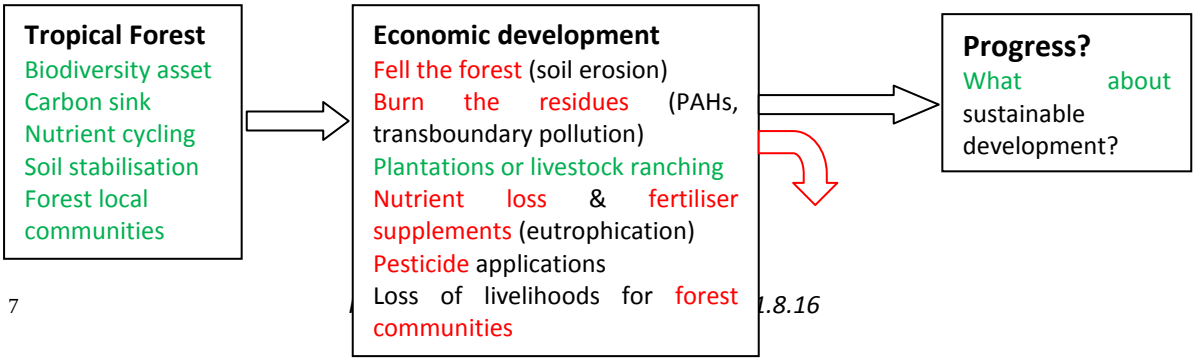
The following simplistic diagram is intended to illustrate the connections which exist in the physical environment, but not sadly in the political environment or even in the minds of some environmental professionals.

High flow condition: turbid, concentrations of pollutants exceed EQS (diffuse pollution)
River floods farms, villages and towns
1,000s tonnes of solids washed off landscape
Answer: "Stop the floods" by dredging the river & boxing it in behind walls in town.

Figure 1. Political 'understanding' of rivers drives inadequate answers to problems.

The same scenario would apply in relation to the management of a potable supply reservoir draining a forestry or agricultural catchment of course. The sediment burden in the high flow watercourse isn't just 'natural' – it often has a major anthropogenic component in excess of that associated with natural vegetation cover.

Another example where identification of root causes of a problem under a single unifying label (diffuse pollution) might drive concerted environmental action, is the loss of tropical forest associated for example with conversion to oil palm plantations. If nature conservationists can join forces with pollution control concerns maybe a better philosophy for land use planning and development may result? Is it necessary for the language of ecosystem services to include more emphasis on diffuse pollution?



Pollution of local watercourses
Siltation of coral reefs & seagrass beds, impacts on fisheries, tourism, pearl industry etc.

Figure 2. Diffuse pollution & development – tropical forests. Key: positive benefits, and negative consequences (externalities for primary land use change unless tax-payer funded).

Many of the landscape measures advocated for diffuse pollution management in forestry and agriculture for example have great potential also for more sustainable development in terms of soil stabilisation and downstream resource use, for habits and biodiversity within developed landscapes, and linking islands of protected habitats too. Bringing externalities into economic planning has been raised in diffuse pollution analysis from the outset (Novotny and Olem 1994, and Campbell et al 2004). In countries where government funding drives the land use intensification broadly as in figure 2, a political consultation should bring all the factors into consideration?

Developing interest

Our initial "Call for Expressions of Interest for the Establishment of an IWA Task Group on Water Quality and Land Use Impacts" in the January newsletter, was successful in identifying interested people and organisations from around the world to take this initiative forward (we are currently drawing up lists of people and shall be in contact directly, after the Brisbane Congress).

Changing land use is resulting in increasing diffuse pollution which impacts water quality and consequently environmental and public health. IWA is proposing to develop a report which consolidates knowledge on the problems and solutions linking land use management and water quality. We are creating a multi-disciplinary task group to guide and develop this report. If you are interested in contributing, please contact Brian D'Arcy (brian@enviroexperience.co.uk).

We received initial expressions of interest from various people and organisations (thanks), notably including water utilities (Australia). A proposal to form a Task Group has been drafted and put to IWA to gain support for this diffuse pollution group led initiative. The interaction between land use and water quality is of fundamental importance for river basin management, with adverse impacts frequently experienced for potable water quality, irrigation, groundwater resources, and coastal waters and habitats. The water quality aspects are of course classic diffuse pollution issues. But this challenge is also part of the remit of other specialist groups, and we are pleased to be able to include experts from several groups on the tentative initial steering group. A broader more inclusive advisory group is also being formed.

The same land-use activities that create diffuse pollution also adversely affect the quantity of water, for example rapid runoff (loss of water) in storm events causing flooding, then drier periods following the rain. The land-use changes often also involve loss of valuable habitats and associated biodiversity; there is common cause to be made in seeking holistic solutions. Demonstrating the importance of all impacts, as well as the processes involved and the links between the various issues, is a key step in driving progress to implement best practice mitigation measures across landscapes and catchments. We are keen to include interest from UNEP, IUCN and others too.

To develop the content of the report, *impacts papers* are sought in support of the initiative of the Specialist Group to develop up to date evidence on the importance of the issue, to be the factual basis

for the IWA sponsored *Land Use and Water Quality Report* in 2019. This needs to involve fresh research as well as review papers on the following aspects:

a) High level state of environment reports - estimating national extent and severity of diffuse pollution impacts on the water environment.
b) Ecological impacts – case studies at any level, from river basin (Mekong? Darling? Elbe?) and coastal waters (Gulf of Mexico anoxia? San Francisco Estuary? Chesapeake Bay?); ecosystems (coral reefs impacted by sediment from deforestation in tropical hinterlands, sea grass beds and freshwater lakes affected by eutrophication); key species of iconic importance (e.g. salmonids and pearl mussels affected by siltation in higher latitude rivers); direct toxicity and bioaccumulation studies (various hydrocarbons/urban drainage impacting freshwater biodiversity, pesticides and PCBs in birds and otters, emerging pollutants too?).
c) Resource impairment and economic impacts – water quality of surface and groundwaters making them unfit for use by industries (e.g. food and drinks, textiles, and high quality paper businesses, needing to abstract clean water); recreational impacts (e.g. declines in salmon fishing, closure of bathing beaches, algal blooms/red tides and 'clean' reputation of water amenities damaged); risk of national/international regulatory actions, e.g. local beaches in breach of faecal pathogens standards, impacts on life and operations of hydro-power generation assets.
d) Water utility impacts – statutory water quality requirements (e.g. for raw potable supplies, for surface water discharges from public networks, and impacts on performance of effluent treatment plans in relation to permits too); filtration plant running costs associated with algal blooms; reduction in life of reservoirs and other assets associated with influent sediment loads; blue-green/cyanobacteria toxins in potable supplies, or *Cryptosporidium* outbreaks, colour and flavours in potable supplies, including turbidity and hydrocarbons respectively etc.

Relevant specialist groups include Watershed and River Basin Management, Diffuse Pollution, Urban Drainage, Lakes and Reservoirs Management, Sustainability in the Water Sectors, etc. In addition, the Basins of the Future and Cities of the Future programmes will provide inputs and take an active role in the development of the report. If this is of interest to you, please contact Brian D'Arcy as below.

Brian D'Arcy
brian@enviroexperience.co.uk

NEWS, PROJECTS, ACTIVITIES & ISSUES

Ideas, football and networking at NOVATECH, Lyons, France 28th June – 1st July 2016.

The triennial NOVATECH conference provided an international dialogue on all aspects of stormwater management, as always, in the wonderful city of Lyon. In an unusual mix of football (soccer) and surface water drainage, the city was heaving with football fans as a venue for some of the European Cup games (notably when France defeated Ireland at the start of the week, and then Iceland easily beat England mid-week). Appropriately for the primary reason to be in Lyons, we experienced a series of very heavy rain storm events too.

Novatech conferences promote strategies and solutions for integrated and sustainable water management, with a focus on stormwater management. Papers are in French or English with

continuous translators ever present to ensure good communication. There were four parallel sessions, with the usual frustrations of interesting ones running at the same time, but that is unavoidable sometimes. A fifth option was often available for various discussion workshop sessions. Three plenary sessions for viewing posters were scheduled. The truly international character of Novatech is reflected in the two conference co-chairs, Jean-luc Bertrand-Krajewski (Insa-Lyon, Lyon, France, and Tim Fletcher (University of Melbourne, Australia), as well as the international scientific committee. With some 200 presentations, oral and posters, representative of research and practices in many countries, scientific and case studies, there was too much to report here, so just two of the innovative or inspiring actions are outlined in the contributions below; *toads in the city*, and *SUDS hedges* (all presentations are on: http://www.novatech.graie.org/a_index.php).

Toads in the city

On 1st July 2016 a group of Novatech delegates were taken to a series of developments in Villeurbane, Lyons, where innovative green infrastructure was being used to achieve multiple objectives including stormwater management. One of the most unusual was a new housing development which had been stopped when a population of the midwife toad (*Alytes obstetricans)* was discovered there. This small toad is unusual in that the males carry the fertilised eggs entwined around the hind legs until ready to hatch, when he drops in a pond or slow-moving water and they are released as tadpoles. At the housing development, the plans had to be re-assessed and a mitigation plan developed in conjunction with the developers and nature conservation experts. A grass swale through the development replaced a conventional stormwater sewer, and use of open grill gully traps was minimised. Natural vegetation replaced the original planting plan, with oak trees and grass meadow features. The toads naturally frequent stony loose soils and river margins, so banks of stone filled refuges have been provided around the development, alongside the swale but also within green space elsewhere for the terrestrial phase of the toads' lives, to provide protection from predators such as domestic cats, and places to escape the glare of the sun. Where the main swale is crossed by a road through the housing estate, a 'crapauduc' has been built (a toad tunnel) to allow safe movement of the toads and other amphibians. It is hoped that the quality of runoff should be mitigated by the grass and gravels in the drainage features.



Toadlets metamorphosed from tadpoles translocated from original breeding pond, the *crapauduc* beneath the main road in the housing development, and Olivier Montavon explaining the toad shelters alongside the swale.

Reproduced from *Froggerblogger* item on http://enviroexperience.co.uk
Full article in press: Saving the Midwife Toad in Lyon, France, by Olivier Montavon, Olivier.montavon@ecosphere.fr , and Brian D'Arcy, *The Geographer*, Royal Scottish Geographic Society, Autumn 2016 issue, Perth, Scotland UK.

SUDS Hedgerows for wildlife & water management, France

At the recent Novatech conference in Lyon, (www.novatech.graie.org) a new idea was presented which has been developed to catch stormwater without consuming any space. It consists of a black box with perforated walls and no base, which allows hedges to be planted within the boxes. The boxes are filled with a purpose designed porous soil filter media, and the boxes are designed with high level inlet and outlet shallow cut-outs to guide wet weather surface flow along the line of the planted hedge. Research in France has indicated that combining several boxes aligned under garden hedges will provide enough capacity to manage a 100-year rainfall event. The reduction in discharge is promoted by both stormwater evapotranspiration and lateral and deeper infiltration[1].

A study about the fate of runoff pollutants in such infiltration systems was conducted and found that pollutants such as hydrocarbons are degraded in the aerobic soil conditions, a major benefit of using green infrastructure drainage sytems[2]. That research has informed the design of the drainage hedges, but they also have benefits for flow attenuation and creating attractive landscape multi-functional features, with wildlife benefits too. Made in France using recycled plastic, these boxes are also eco-friendly (for more information contact: contact@efoh.fr).

Plastic box frame drainage planters taking roof and garden plot drainage, France

[1]Leroy M-C, Moncond'huy V and Benard M (2016). Water ladders : easy and innovating tool for stormwater management at the pilot scale. Abstracts of the 9th Novatech international conference : *L'eau dans la ville / Urban Water – planning & strategies for sustainable management*, pp. 147, as below :

[2]Leroy M-C, Marcotte S, Le Derf F, Legras M, Moncond'huy V and Portet-Koltalo F (2016). Runoff treatment by road-side swales : soil and plants improvements. Abstracts of the 9th Novatech international conference : *L'eau dans la ville / Urban Water – planning & strategies for sustainable management*, pp. 223, GRAIE, Campus LyonTech La Dua, Lyon, France. Proceedings on website: www.novatech.graie.org

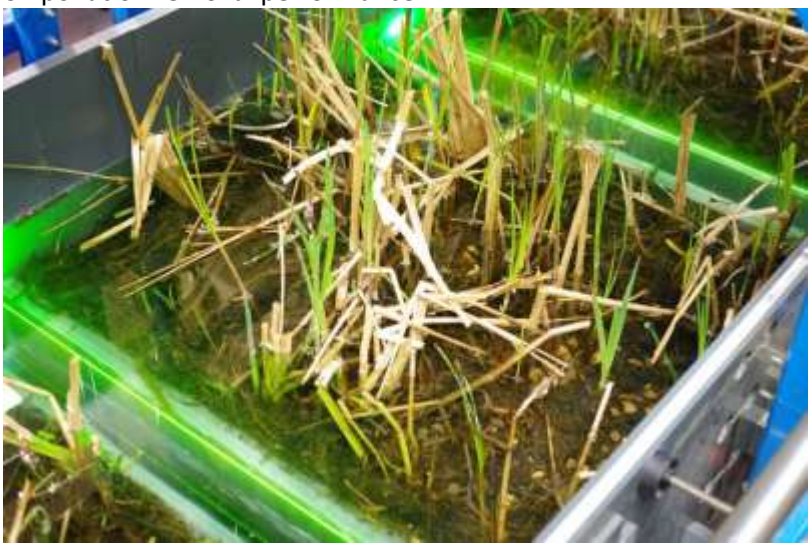
Dr Marie-Charlotte Leroy
contact mcleroy@infraservices.fr

Editor's comment: could this be a green infrastructure (low hedge) alternative to vertical kerbs around traffic-facing street-edge planters, more easily allowing sheet flow runoff to enter the biological treatment zone of a bioretention feature behind the hedge? It would also help eliminate amphibian mortalities in road gullies, an issue noted in the previous newsletter, by reducing the need for them.

Residence Times in Vegetated Stormwater Ponds, UK

The final workshop for this EPSRC-funded project was held at the University of Warwick on 6 July, 2016, attended by over 40 practitioners and academics. The three-year project was a joint initiative between the Universities of Warwick and Sheffield, aimed at bringing together laboratory work, field work and computational modelling to present a complete picture of mixing processes in vegetated ponds. Mixing processes determine the residence time distribution, which determines how effective a pond is in treating suspended sediments, nutrients and other pollutants in stormwater runoff.

One highlight of the research – not without its challenges – has been the introduction of real vegetation (Carex and Typha) into the Warwick laboratory for highly-detailed dye tracing and flow velocity measurements. We have also collected complementary in-situ field data from a full-scale stormwater pond operated by Highways England. At Sheffield the work has focused on identifying novel approaches to representing the mixing processes within Computational Fluid Dynamics (CFD) modelling tools, thereby permitting pond designers to explore the impacts of pond outline and vegetation configurations on pollution removal performance.



Vegetated measurement section in the laboratory flume

For more information:

- vpond.group.shef.ac.uk
- Virginia Stovin, University of Sheffield, v.stovin@sheffield.ac.uk
- Ian Guymer, University of Warwick, i.guymer@warwick.ac.uk

Controlling diffuse pollution in urban areas using biofiltration systems

A White Rose Consortium collaborative research project aiming at investigating biofiltration systems has been carried out by the Universities of Leeds, Sheffield and York. Biofiltration systems are landscaped Sustainable Drainage Systems

(SuDS) that provide rainfall-runoff volume and peak flow attenuation and a number of pollutant removal mechanisms (e.g. filtration, adsorption, biological treatment); they are thus particularly suitable for urban road runoff and car parks. The vertical arrangement of treatment stages leads to a relatively compact footprint, making them a promising retrofit option even for dense urban areas (see scale model, right). The design and the choice of plants, media composition and drainage configuration all impact upon hydrological, water quality and long term performance. The potential of these systems within UK climatic conditions has not been exploited. The ultimate objective of this collaboration is to develop a deep understanding of biofiltration performance, leading to system refinements that optimise performance for prioritised hydrological and water quality objectives. The consortium partners have highly complementary expertise across a range of disciplines which will allow us to develop a comprehensive understanding of pollutant sources, pathways, transformations and impacts, in addition to quantifying rainfall/runoff processes. The effectiveness of amended media for dissolved metals and phosphorus removal is under investigation through a laboratory study. These results will identify the biofilter configuration to undergo a long term field test in a commercial car park in Leeds.
Consortium:C.Berretta, M. R. Tillotson, A. Aiello (water@leeds, University of Leeds)
V. Stovin, H.S.Jensen(University of Sheffield), A. Boxall, J. Thomas-Oates (University of York)

Contact: Christian Berretta c.berretta@leeds.ac.uk

Valuing Your Soils: New Guidance for Scottish Farmers, Crofters & Land Managers

It can take 500 years to replace 25 mm (1 inch) of top soil, yet in the UK it is estimated that 2.9 million tonnes of soil are eroded each year, and soil quality is diminished by poor practices. “Valuing Your Soils”, is newly published guidance, which will help Scottish farmers, crofters and land managers protect and manage their most valuable resource.
This is important because farmers are under increasing pressure from climatic events, like last winter’s heavy rains, which had dramatic effects on farm businesses across Scotland. Poor drainage and waterlogged fields can encourage soil compaction problems contributing to poor nutrient uptake by crops and reduced yields. Less obvious are issues associated with poorly drained grasslands which, for example, can encourage parasites leading to poor livestock nutrition and health.
Mark Aitken, Principal Policy Officer for the Scottish Environment Protection Agency (SEPA), who requested the production of this much needed practical advice, said
“Protecting Scotland’s soils and environment is now more important than ever in the face of current economic, climatic and environmental challenges. The “Valuing Your Soils” brochure encourages good management practices that will improve soil quality, help maintain healthy soils and in turn improve farm profits and protect the environment. The publication is also immensely useful because it highlights the importance of good soil structure in protecting and improving water quality, and also helping to reduce flood risks.”
The new guidance (funded by CREW (Centre of Expertise for Waters) at the request of SEPA) was produced with input from Scottish farmers, researchers and consultants from Scotland’s Rural College (SRUC) and industry experts guided by a steering group including CREW, SEPA, industry levy body AHDB, NFUS, Scottish Water, SNH, QMS, Forestry Commission Scotland and the Scottish Government.
Brochures were distributed at the Royal Highland Show and other agricultural shows across the country. Electronic versions can be downloaded at
http://www.sruc.ac.uk/info/120603/farming_and_water_scotland.
There is useful information about Scotland’s agricultural soils and practical advice outlining the upfront financial savings and business benefits of better soil management and the efficient use of resources.

Action and problem-specific 'field-sheets' are designed for busy farmers with limited time for reading. The appendix contains more detailed technical information and research case studies highlighting evidence from current investigations of Scottish farm soils. Web links within the brochure will help increase awareness of good management practices, funding opportunities and the current regulations concerning soils in Scotland (e.g. Good Agricultural and Environmental Conditions and the Diffuse Pollution General Binding Rules).

Fiona Napier
Fiona.napier@sepa.org.uk

16-18 March 2016: International Conference on Green Infrastructure and Resilient City, Shenzhen, China.

Shenzhen is pleasant sub-tropical city in southern China, with plenty of greenery, including LID features around the university campus there. The conference brought an international focus on LID technology, green infrastructure, and resilience for climate change. An inspirational lead presentation from Prof Yu of Peking University set out the vision for *sponge cities* – but was far more than aspirations, showing many actual example features in Beijing contributing to a far sighted plan to build flood management resilience for the city. The wetlands illustrated showed how popular such features have become, as well as indicating their attractive design and development as green city features.

That presentation was followed by an equally impressive one from Professor Che Wu, who quantified urban drainage impacts and the water quality issues driving LID provision within the Sponge City over-arching concept. To see such progress, and the allocation of adequate resources to monitoring problems and effectiveness of solutions, gives hope for the future, not just in China, but everywhere. The Professors Yu and Wu would enhance diffuse pollution conferences anywhere (*conference planners please note!*).

The excellent conference was a collaboration between Chinese researchers and universities, with colleagues in America and Europe, led by Prof Nian She, at Shenzhen University (and formerly in Seattle, Washington State, USA). The conference was organised by Shenzhen University, Ecological Urban Planning Academic Committee (EUPAC) of Chinese Urban Planning Society in China and ASCE/WERF in USA, with speakers from Australia, Europe, Korea, USA, and others, bringing international perspectives and experience. EUPAC is a branch organization of Chinese Urban Planning Society (CUPL), founded in 2008, consists of leading specialists from universities, professional institutes and administration sectors http://www.planning.org.cn **.** Presentations and more information at: **GIRC@qq.com .**

Brian D'Arcy and Nian SHE
nianshe@szu.edu.cn

Developing policy and practice for Blue-Green Drainage Solutions in Iceland

The first steps in introducing blue-green drainage solutions (BGDS) in Iceland where taken in the town of Gardabaer, during the master planning of a new neighbourhood called Urridaholt and a connected retail park, Kauptún. The plans were finished in 2007 and 2006 respectively. Kauptún has been fully developed and Urridaholt is still under construction.

Urridaholt is a new 100 ha. community, located on a hillside, with a pristine lake below the hill, surrounded by wetlands and meadows. The blue-green drainage solutions were implemented to protect the lake and its wetlands. The Urridaholt master plan was developed in close cooperation between political leaders and professionals from many fields with community participation, emphasizing quality of life and sustainability.

Example of a swale in Urridaholt (left), and swale by a family house in Urridaholt, Gardabaer, Iceland

Urridaholt - Kauptún is pioneering as a sustainable development in two important ways. First is the implementation of the blue-green drainage solutions. It is believed to be the first BGDS project of this scale world-wide where established methods had to be adapted to such a steep hillside and climate conditions at this latitude. Secondly, it is the first master plan in Iceland to be certified by the internationally acclaimed BREEAM Communities assessment method. Alta consulting, Iceland (www.alta.is), oversaw project management and master planning with JTP, UK (www.jtp.co.uk) as leading designers.

The Urridaholt-Kauptún example has created some interest in Iceland on the use of blue-green drainage solutions amongst municipalities and professionals in this field as well as professors at the University of Iceland. The current municipal plan of the town of Reykjavík, includes a policy of the use of BGDS in certain areas. Reyjavík has also put BGDS into planning stipulations in some new site plans in Reykjavík, which still have to be executed.

Left: *The largest green roof in Iceland and swales, in Kauptún, Gardabaer, Iceland*

Below: Swales and permeable parking areas at IKEA, Kauptún, Iceland (left in plan, right one example close-up).

The National Planning Agency of Iceland is responsible for preparing the National Planning Strategy of Iceland on behalf of the Minister for the Environment and Natural Resources. The use of BGDS is encouraged in the National Planning Strategy 2015 - 2026. The National Planning Agency of Iceland and the Federation of the Icelandic Electricity Industry, District Heating, Waterworks and Sewage Utilities are currently drawing up first guidelines on how to introduce BGDS with the assistance of Alta consulting.

The awareness of potential benefits of the use of BGDS in Iceland has been increasing fast during the past few years, within municipalities, policy makers and professionals, so I am convinced that the use of BGDS will be increasing fast within the next decade.

See here a TedX on the Urridaholt development "Incorporating Nature in Urban Planning" (https://goo.gl/Wlrj6b)
See here a short videoon the BGDS in Urridaholt (https://goo.gl/IxzhTM).
See here the case studyon Urridaholt at Breeam communities (http://goo.gl/1HnjfL).
The Gardabaer municipality, Iceland www.gardabaer.is
The Urridaholt neighbourhood, Iceland www.urridaholt.is
The National Planning Agency of Iceland, www.skipulagsstofnun.is

Halldóra Hreggvidsdottir, halldora@alta.is
General Manager of Alta consulting www.alta.is

The Anthropocene

At the 35th International Geological Congress in South Africa an announcement was made by a working group that plant Earth has entered a new geologicial epoch because of the extent of humanity's impact on the planet. The suggested era – the Anthropocene – is still controversial and the case for adding a new Geological era, has to be recognized by the International Union of Geological Sciences. But for diffuse pollution scientists and environmentalists, much of the evidence is classic diffuse pollution. Changes cited include marked acceleration of rates of erosion and sedimentation, large scale chemical perturbations to cycles of carbon, nitrogen, phosphorus and other elements, for example. A greater focus on that might be more appropriate for environmental management than arguing about whether it represents a new geological epoch?

At a recent Glasgow University seminar on 'Imagineering the Future' Dr Robert Westaway (Senior Research Fellow) presented a thought provoking paper on the scale of changes, and speculated on what might be a rational start date for such a new era. The balance of evidence was unclear about a start date: agriculture and deforestation? 18th century? Industrial revolution? Chemical industry? Automotive transport and beginnings of globalization? Nuclear technology and global contamination? (But does a Geological epoch have a start date fixed to the nearest decade?).

More importantly for readers of this Newsletter, there is clearly a body of science quantifying diffuse pollution impacts against a time line of land-use change, which we can learn from and use in presenting evidence to policy makers and governments. The quantities of sediment carried by rivers was one of the most impressive facts reported, associated with human impacts on the landscape: classic diffuse pollution phenomena.

We hope to have an article from Robert in the Winter 2016/17 issue of this Newsletter.

Reference

James P. M. Syvitski and Albert Kettner (2011) Sediment flux and the Anthropocene, Phil. Trans. R. Soc. A, published 31 January 2011, doi: 10.1098/rsta.2010.0329369 2011

PHOTO FEATURES: research sites & example issues


1. In-field farm sediment trap, and example arable field in Loch Leven catchment, Scotland. Ref. Duffy A, Moir S, Berwick N, Shabashow J, D'Arcy BJ and Wade R (2016). Rural Sustainable Drainage Systems: A Practical Design and Build Guide for Scotland's Farmers and Landowners. CRW2015/2.2. www.crew.ac.uk/publications

Alison Duffy a.duffy@abertay.ac.uk

2. Tolka Valley stormwater urban wetland, 4th August 2016 *Photo credit John Collins*) a decade since contructed. See Collins J and McEntee D (2007), *A Constructed Wetland for the Removal of Urban Pollution in the Finglaswood Stream, Tolka Valley Park, Dublin*, Paper presented at IWA conference, 2007, available from Dublin City Council, Drainage Division, Civic offices, Fishanble Street, Dublin 8, Ireland

3. Constructed farm wetlands, for steading runoff from livestock farms, Anne Valley Ireland (*photo credit Rory Harrington*).

4. A collection of street debris – examples of a source of toxic metals in road runoff when crushed by heavy trucks and the dust is washed off into drainage networks, *photo credit, San Francisco Estuary Institute*, (SFEI). See next news item in this Newsletter, and www.sfei.org/rmp

A wealth of knowledge about diffuse pollution in San Francisco Estuary, California, USA

Diffuse pollution features heavily in the forward looking special issue of *The Pulse of the Bay, The State of Water Quality: 2015-2065*, a report by the San Francisco Estuary Institute, SFEI. The report gives an update on several classes of pollutants including nutrients, toxic metals, legacy pesticides, PCBs, and pathogens. The report update on Priority Contaminants follows a convenient summary format for the data, per class of pollutants:

Recent Advances; Impairment; Spatial & temporal patterns; sources, Pathways & Loadings – next steps.

For example, PCBs remain a concern due to elevated concentrations, particularly in sport fish such as the Shiner surfperch. The largest input load pathway is urban stormwater. For mercury, significant source areas include former mining districts, and urban stormwater.

SFEI (2015). The Pulse of the Bay: the State of Baywater Quality, 2015 and 2065. SFEI Contribution // 759 . San Francisco Estuary Institute, Richmond CA. www.sfei.org/rmp

Heavy road traffic

The next conference of the IWA Watershed and River Basin Management Specialist Group will be held in the Skukuza headquarters camp in Kruger National Park in South Africa. As well as anticipating a full program of papers on all aspects of river basin management, including diffuse pollution issues, the Kruger is of considerable interest itself. The rivers which cross the park variously drain mining catchments, rangeland with livestock, then intensive sugar cane farmland. Mining inputs include dust blown from one of the world's largest open cast copper mines (studies in the Kruger have been undertaken looking at copper in crocodiles there). Water is abstracted en route and the rivers then pass

into Mozambique, with all the sensitive trans-frontier water sharing issues. And being inside the Kruger is of course an unforgettable, wonderful experience.

Conference of the IWA Watershed and River Basin Management Specialist Group, 9-11 October 2017
Skukuza, Kruger National Park, South Africa.
www.iwa-network.org/all-events/

NEWS OF FORTHCOMING EVENTS Diary

9-13 October 2016, IWA Biennial World Water Congress & Exhibition, Brisbane, Queensland, Australia

The IWA Congress and Exhibition is the Association's main conference, held every 2 years. **Brisbane 2016** will highlight water and industry (mining and resource extraction), and will also feature a joint workshop theme co-led by the diffuse pollution specialist group.

More information: http://www.iwa-network.org/iwa-events.php

23-27 October 2016. IWA Regional Conference on Diffuse Pollution and Catchment Management, Dublin City University, Dublin, Ireland

Abstract submissions are now open, deadline for submission is 25th March 2016. For further information regarding the conference, and to register, please visit: www.dpcm2016.com
Or email dpcm2016reg@keynotepco.ie

13-17 August *(provisional)* **2017 UCLA, Los Angeles, California.**

IWA Dipcon: specialist conference on Diffuse pollution and Eutrophication; details to be announced, c/o Dr Michael Stenstrom

9-11 October 2017, Skukuza, Kruger National Park, S Africa.

Abstracts are invited for the 14th Specialist Conference on Watershed and River Basin Management. See IWA website for more details: www.iwa-network.org/all-events/

November 2017. 2nd Biennial Green Infrastructure Conference, Glasgow, UK. Scottish Green Infrastructure Forum, www.sgif.org.uk

NEWS FROM IWA PUBLISHING

Wealth Creation without Pollution – Designing for Industry, Ecobusiness parks & Industrial Estates

Brian J. D'Arcy, Lee-Hyung Kim and Marla Maniquiz-Redillas (eds.)
There is a need to try and develop a common view of best practice for commercial and industrial developments, not just for pollution prevention, but also to foster an economic 'level playing field' internationally. Therefore delegates from Korea, Thailand, China and UK agreed at the IWA diffuse pollution conference in Korea in October 2009 that a proposal for a collaborative international best practice project should be developed that would be led by those representatives, and include input from USA, Europe and elsewhere. That initiative led to a succession of papers presented at DIPCON and other conferences in the succeeding years. The best of those, for the aims of the book, together with additional purpose-written papers, have been brought together for publication by IWAP. The book should be available early in 2017.

For more information on IWA Publishing products or to buy online visit www.iwapublishing.com

WRITE TO US!

The Newsletter is an opportunity to share information: points of view; policy developments; research; activities and events; worldwide. If you have an interesting project, comments, or are planning a conference or workshop, send it to us, including contact point for more information.

Brian D'Arcy at E-mail: brian@enviroexperience.co.uk

Disclaimer: *This Newsletter is issued by the IWA Specialist Group on Diffuse Pollution. Statements made in this Newsletter do not necessarily represent the views of the Specialist Group or those of the IWA. The use of information supplied in the Newsletter is at the sole risk of the user, as the Specialist Group and the IWA do not accept any responsibility or liability.*

IWA Head Office
Alliance House
12 Caxton Street
London, SW1H 0QS, UK
Tel: +44 207 654 5500
Fax: +44 207 654 5555
General e-mail: water@IWAhq.org.uk
Membership e-mail: members@IWAhq.org.uk

IWA Global Operational Office:
New Babylon – Den Haag
Anna van Buerenplein 48, 11th Floor
2595 DA Den Haag
The Netherlands