

NORIS PROJECT INVESTIGATES THE EFFECTS OF POLLUTION OF RAINFALL RUNOFF:

# The adventures of a raindrop

You'd think rainwater is pretty clean and could be allowed to run off into surface water without much ado. But, in fact, having travelled across the roof of a house or an asphalt road, that rainwater might not be so clean after all. TNO is studying the quality of water that runs off, unpurified, into ponds and ditches.

There are two types of drain cover in the neighbourhood of *De Wadden* in the village of Wieringerwerf, in the northwest of the Netherlands. They hardly differ but for the text written on them. One has 'VW' on it, the other 'RW'. The first acronym refers to 'Dirty Water' (in Dutch: 'Vuil Water') and the second to 'Rainwater' (in Dutch: 'Regenwater'). The water under the first comes from households and businesses and is destined for the water treatment plant, while the water under the second drain cover flows straight into a nearby lake.

At first glance, it only makes sense to separate the different types of water. After all, there's no need to purify clean rainwater, is there? Yet the answer to that question is no longer clear cut. 'There are doubts,' says TNO's Diana Slijkerman. It is unclear whether rainwater is clean enough to flow straight into the surface water. 'Because, it isn't pure rainwater. Before it reaches the drains, it

## Rural water quality

Diana Slijkerman's research principally involves cities and towns or industrial parks, but TNO is also engaged in research into the quality of groundwater in rural areas. Dr Jasper Griffioen and his colleagues in the Soil and Groundwater division, are characterising the contamination of groundwater by fertilisers, heavy metals and herbicides and pesticides. 'Having done that,' says Griffioen, 'we draw up models that predict the consequences for the surface water and drinking water. Based on those, provinces, water boards and other involved parties can take measures in good time. The need for this has been heightened by the requirements of the European Water Framework Directive, which is now being implemented.'



flows over roofs, roads and all sorts of other surfaces. We don't know enough about the substances that it picks up, let alone the biological and other effects those substances could be having on the ecosystem.'

Slijkerman refers not only the zinc on roof-gutters and lead of the flashing but she's also thinking of pesticides and herbicides, bacteria in dog faeces, leaves, oil from passing cars and pollutants on industrial premises. 'The distance between a roof or a road and the drain isn't long, so you'd think this can't be that much of an issue. We are investigating whether that indeed the case.'

### European project

Wieringerwerf is a good place for this type of research. In the late 1970s a dual drainage system was installed in the town and the Hoogheemraadschap Hollands Noorderkwartier, the regional water board, was curious to know what effect it was having on the surface water. When it rains, Slijkerman and employees of the water board swing into action. They take samples of the water that flows into the ponds and ditches from the drainage pipes and back at the lab they analyse the chemical composition. They also study the chemical and biological characteristics of the ditch and lake water before and after a rain shower. To get an idea of the consequences of any contaminants that may be present, they also compare the chemical and biological composition of that water with surface water that hasn't come into contact with runoff rainfall. The quality of the rainwater that falls straight out of sky into the surface water is not a topic of study. 'We are regarding that as a given in our

analysis,' says Slijkerman.

The measurements are part of a European project called NORIS (NO Rainwater In Sewers) and it is investigating various aspects of dual drainage systems. The participants include municipalities, water boards and research groups in Germany, Great Britain, Belgium, Sweden and the Netherlands. Each country is carrying out sub-projects and is keen to learn from the other partners. The Germans, for example, are experienced in filtering rainwater using carbon filters in catch basins and are focusing on their effect on water quality. Flooding is an increasingly frequent problem in the UK and the British are keen to learn more about the relationship between dual drainage systems and water quantity. All in all, it's a question of improving the environment and searching for ways to drain water responsibly and efficiently.

The monitoring in Wieringerwerf is part of the *environmental improvement* package for which TNO is responsible. 'We are also organising transnational workshops at which future problems, for instance, are being identified,' says Slijkerman. 'And it is our job to advise the other partners about monitoring activities.'

### Crustaceans and algae

The NORIS project has now been running for 22 months and is halfway through its term. While it's a little early to be presenting results, Slijkerman is nevertheless willing to hazard a guess as to what they'll find. 'It seems that the rainwater that goes straight into the ponds and ditches of Wieringerwerf is less clean than you'd think. The water

## 'A GOOD PARTNER'

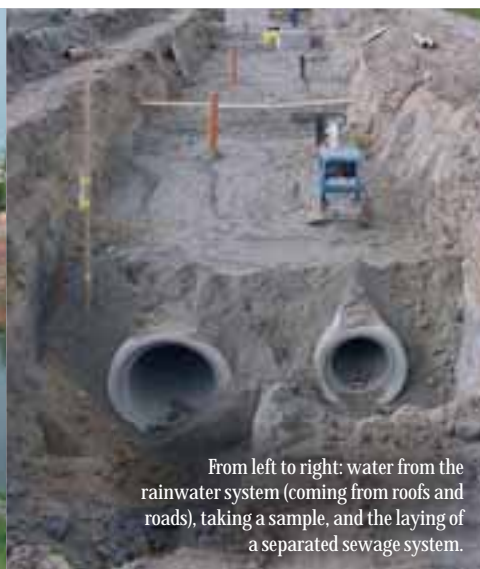
'We have been working with TNO for some time now and this project fits well into our partnership,' says Robin Bos, NORIS project leader with Hoogheemraadschap Hollands Noorderkwartier, the regional water board. 'It was TNO who alerted us to the possibility of getting EU money for a study of the ecological effects of discharging rainwater straight into the surface water. A useful study: now we are in a position to find out whether in solving one environmental problem – separating sewage water and rainwater to reduce combined sewer overflows – we are creating another.'

'TNO is a good partner, its employees are experts with whom we can discuss issues on an equal footing. The STOWA (Dutch acronym for the Foundation for Applied Water Research), the national research institute for the water boards, has plans to start similar studies elsewhere in the country. That says it all.'

from a measuring point on the edge of the industrial park, for example, is cleaner than the water taken from the residential neighbourhood. Our biological analysis concerns, among other things, the effects on algae and water fleas. In the laboratory we are observing differences in their growth and survival between those found in the industrial park's drainage system and those found in the system in the residential neighbourhood. We are still analysing the field data, but I can already say that the population of crustaceans and algae in ponds and ditches into which water is being discharged is not what we had expected.'

The forthcoming Dutch work on the NORIS project should shed more light on the cause of the identified effects, the sources of the contamination and the type of substance or substances that are responsible for the effects. 'At that stage, you can do something about the source or the drainage route, perhaps using the German filter techniques,' concludes Slijkerman.

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From left to right: water from the rainwater system (coming from roofs and roads), taking a sample, and the laying of a separated sewage system.