WALLINGFORD PROCEDURE - RESEARCH AND DEVELOPMENT

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The development of the Wallingford Procedure in the last
year has moved closer to the research aims which were
already identified a year ago, rather than introducing
any new ideas. This is because so much of the effort is
concentrated on modelling water quality; which has had a
very long development time, but is finally coming close
to fruition.

The Wallingford Procedure has always been more than just
a computer program. From the earliest days there was
also a procedure of how to use the programs in real
situations. Initially this was a philosophy for
designing new systems. It developed to a method of
assessing existing systems with the WRc Sewerage
Rehabilitation Manual. This parallel development of
tools and philosophy has continued in the past year. If
anything the philosophy now leads the tools, or at least
the power of computers which run them.

THE PHILOSOPHY

Initially the emphasis in rehabilitation studies was on
sewer structural failures. As systems were studied, the
problems of flooding became of more concern, now the
emphasis is moving towards pollution. This was first
tackled by the SRM interim procedure, which gives a good
estimate of total annual polluting load. The current
work is to develop methods of calculating the total
pollutant load in a particular event, and the peak
polluting load during an event. These are considered to
be essential items of information for the good management
of sewerage systems in the future.

Pollution incidents happen much more frequently than
flooding incidents. On some systems they occur each week
or month, rather than the once every ten years of
flooding. It is therefore necessary to have a new
approach to the rainfall input to the procedure. The WRc
rainfall time series was developed to allow consideration
of event up to a one year return period, and is already
in use with the interim procedure. This is being
developed further, firstly to make it more general, and
secondly to extend it to longer return periods. This
work could eventually lead to synthetic time series which
are as easy to use as the synthetic design storms.

For both flooding and water quality studies the geographical area to be considered in a study is increasing. At one stage we were happy to remove the water from the urban area without causing flooding. Now there is more emphasis, particularly in the congested south east, on the effects of the water further downstream. More and more studies are involving the consideration of urban and rural catchments together. Limits are being put on the discharge which can be made to natural watercourses. The analysis of those systems where there may be storage in the urban system and in the rural system requires integrated sewerage and river flow models to look at the coincidence of peak flows from the various catchments.

It is of course pointless to look at the movement of pollutants through the sewer system without also looking at what happens to them when they reach the river; which is where we are concerned about pollution. The philosophy therefore includes methods of assessing the impact of pollutant discharges on the rivers. These are again developing from total annual load models to total event load, and full-event simulation models.

For water quality the scope of the study spreads even further. The river environment is affected not only by storm overflows from urban systems, but also by the discharge from sewage treatment works, and by natural and agricultural discharges. In order to demonstrate the effect of the urban system, and to reduce its effect, it is necessary to study the entire picture. The WRc River Basin Management programme therefore includes studies on the effects of agricultural pollution, and has recently set up a project to establish means of modelling the time variability of pollutant load from sewage treatment works.

Within the next year the philosophy will develop to the stage that prediction of the pollutants from sewer systems and their impact on the river system can be predicted. With the division into plc and NRA this will become of crucial importance as it will form the basis for much of the dialogue between the two organisations.

THE TOOLS

The tools to be used to implement the philosophy have also developed during the year. This has involved improvements in both the calculation methods used by the programs, and in the presentation of the programs.

WALLRUS has been released, after much heralding, to introduce some much-needed improvements to WASSP. These include some changes to the runoff model which were described at the spring meeting; some more robust routines for calculating the continuation flow at tanks, and the addition of free surface backwater routines to help with the analysis of large diameter sewers with flat gradients. It also brings some of the mainframe advantages to the micros with spatially varied rainfall, and unlimited storm duration.

After many years of campaigning there is now a serious project to develop a completely new urban runoff model. This has started this autumn, and the results of it should be in general use within a year. (Although that statement is made even before we have started on the difficult parts of the project.)

The development of the sewer pollutant routing model MOSQITO has continued during the year. We now have the structure of the model complete, and need to complete calibration for the test catchments and investigate how well this calibration represents a variety of other catchments.

To go with the wider view of the catchments some compatible river models have been developed, and are beginning to be used on a variety of schemes in conjunction with the urban sewerage models.

To consider now the advances in computer hardware and techniques which have been made during the year. The Wallingford Procedure has now expanded from the microcomputer PC market to the UNIX workstation market. These machines are more powerful than the previous ones, but the use of UNIX also makes them less friendly to the inexperienced user. We now have the choice of ease of use with limited speed and capacity, or size and power which is less easy to use.

We have also continued to develop the ease of use of the programs. The new version of MicroRat which is included with WALLRUS shows one direction of development with an easy to use text and number editor. This in an improved form will be the basis of many programs in the near future. This provides a common "look and feel" which a user can quickly get used to. We have also in the last year released a program using the advanced graphics techniques and point and click menus which we have been developing for some time. This is not, unfortunately, an urban drainage program, but the techniques can now be incorporated into urban drainage programs.

Another important development during the year has been a new style of user manual. Two and a half new manuals have come out this year (the WALLRUS manual is partly the old WASSP manual). The MicroRat and CHAT manuals show the new style with separate sections for the engineering background of the method, a tutorial guide for new users, and a reference guide for the more experienced. This is as important as the development of the software of the tools, because they are essential to their correct use.

CONCLUSION

There are therefore three strings of development which have continued during the year. The development of the philosophy of how to use the techniques, the development of the techniques themselves, and the development of computer methods and manuals to make the techniques easier to use.

NEXT YEAR

The next year will see a lot of developments which may greatly change the work which we are doing, and how we have to do it.

The procedure for assessing pollutant discharges and river impacts will be released, along with the tools MOSQITO, CARP, SPRAT and others to implement it. For those who find verification of flow models difficult this will be a good time to retire.

The new urban runoff model will be completed, and may remove many excuses for poor verification fits, by correctly representing the runoff from permeable areas.

A new version of WALLRUS should be released with a wider range of ancillary structures, and using the new editor and graphics techniques which have been tried out this year.

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The speed of computer hardware will increase even more, with the possibility of using transputers. For a few thousand pounds this would upgrade your PC to be faster than anything else you are currently using.

There may also be improvements in flow survey instrumentation and ir methods of collecting catchment data. However data collection will still involve a lot of going down manholes and searching through CCTV records.

However the most far-reaching changes over the next year will be due to the reorganisation which privatisation brings. This will lead to changes in emphasis in the work which we all do, and also possibly to different people doing the work in different organisations.

DISCUSSION NOTES

Technical Session 1

Paper 1.1 Discussion

R.Long; Scott, Wilson & Kirkpatrick

More information out of WASSP would be useful, such as a schedule
of proposed sewers. Any work on this ?

M.Osborne, H.R.Ltd.

Not really. Various programs produced by 3rd parties are under
development.

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P.Bird; Stevenage B.C.

Is there a depth/storage relationship for storage ponds in WASSP?

M.Osborne

No. It will be included in WALLRUS next year.

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R.Dew; Yorkshire Water

The Programs require powerful machines - are micros and
mainframes going to be supported ?

M.Osborne

H.R. will keep on supporting micros - we are pulling back from
mainframes as lots of problems exist due to non-standard
operating systems. WALLRUS on mainframe is very difficult due to
user interface.

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R.Dew

Should we buy WALLRUS now or wait for the revised version in
1989 ?

M.Osborne ; H.R & D.DeLaPlace H.R.

You will not lose out financially if you buy WALLRUS now. You
will get the new improvements as part of a maintenance
arrangement. If you delay excessively it will cost a lot more.

cont'd.

T.Atkins : Gloucester City Council

Does WALLRUS route runoff differently to WASSP ?

M.Osborne : H.R.Ltd.

The P.R. equation is applied globally to the catchment in WASSP,
whereas in WALLRUS it is applied individually to pipes.

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