

Editorial

This issue of our Journal illustrates the range of interests that come together under the one rubric of hydroinformatics, while at the same time showing how such apparently disparate interests are none the less linked together. It also indicates how the results obtained at one level of analysis may influence results proceeding at other levels again.

The papers in this issue have then been ordered with the express intention of demonstrating this dependence along the so-called 'knowledge supply chains' of our subject.

The first paper, of Green and Nelson, is given over to establishing relations between what we know about land topography, such as is nowadays archived in Geographic Information Systems (GISs) and what we should like to know about runoff over land surfaces following rainfall events. It has long been observed that we usually have an immense amount of detailed and obviously relevant information available about the topography of land surfaces, and often we know quite a lot about the soil conditions close to the surface. Similarly we have a great deal of knowledge about how precipitated water infiltrates, ponds and flows in various ways over and immediately under the soil surface. At the same time, however, this information is scarcely used at all in most so-called 'lumped' rainfall-runoff models, which are of the rather derogatively named 'pots-and-pipes' kind, since they conceptualise the entire process involved in terms of what can always be reduced to a system of reservoirs joined by pipes and channels. Such 'models' then depend, for any predictive capacity that they may provide, upon extensive calibration procedures. Existing distributed deterministic models, of the kind generated by generic modelling systems and as used for many, if not most, larger projects nowadays, naturally make use of all the facilities of GIS environments and are provided correspondingly with seamless interfaces to specific GISs. They also bring together the quasi-totality of all data, information and knowledge appertaining to the application concerned. However, the models produced by these large systems appear to be unnecessarily complex for such relatively simple tasks as rainfall-runoff simulation.

The paper presented here then proposes a cheap alternative that is based upon the topography of the land surface exclusively, such as is readily available in GIS formats. It is then, however, restricted as it is presented to situations in which runoff can be divided into sheet flow, shallow but more concentrated flow, and regular stream flow. Such flows are commonly called Hortonian overland flows, being named after the originator of this restriction to flows associated with a singular precipitation event (Horton 1933). Already from the 1970s, however, hydrograph separation techniques based upon the identification of different isotopes have shown the importance of separating event water from pre-event water when separating overland flow from flow passing along groundwater ridges and through macropores, such as is often described as 'interflow'. These latter processes are quite commonly of the same order of importance as overland flow. Although the present paper does not make this separation and shows no systematic comparison between the results that it provides and measurements in nature, it does open a convenient and potentially very cost-effective door to such further studies.

The second paper, of Muleta and Nicklow, is concerned with one of the many adverse consequences of accelerated runoff of the kind that is wreaking such havoc over large areas of our planet today, which is that of erosion and the often closely associated pollution of soil surfaces. This paper is directed to work proceeding further along the knowledge supply chain, at the level of decision making in watershed management. It is directed to improving land use as a means of reducing erosion within the constraints imposed by the overall social-economic situations of the landowners and groups of landowners concerned. This emphasis on the personal interests and responsibilities of the concerned individual is a central issue in applications of hydroinformatics today: words such as 'validity' and, even more, 'trust', that arise in this paper, are accordingly rapidly becoming the new currency of hydroinformatics. Thus, although this paper may appear at first sight to have relatively limited objectives, the range of phenomena that it covers is important, and

especially so as it relates its insights into these phenomena to individual and social-group intentions and is thus directed to addressing pressing social needs.

Proceeding further along the knowledge chain again, we arrive at the problem of making the results obtained from applying complexes of hydroinformatics tools more easily applicable, and thus more immediately useful, to those persons who are primarily interested in the knowledge content of the results. Once again, these persons are primarily 'consumers of knowledge' and have little or no interest in the details of the knowledge-acquisition and refining processes that underlay the content. This position necessitates that theory, methods, raw results and their data, information and knowledge products must be encapsulated in such ways that they can easily be configured, accessed and assimilated by those individuals and social groups who need them as and when they need them. A new emphasis is then placed upon the elaboration of user interfaces that can be easily configured so as to be the most appropriate to the specific individual end-users and classes of end-users of the knowledge content. In the current vernacular, this corresponds to a process of 'customisation' which necessarily complements a process of what is increasingly called 'commoditisation' of knowledge, leading to the notion of its 'mass customisation'. The paper of Westervelt and Holland addresses this issue within the context of one particular land management system with important implications for the use of water. This should make it possible again for very many persons and groups to apply the products of data networks, data collation systems, modelling exercises and other such activities within their everyday activities.

A somewhat related fourth paper, of Sousa *et al.*, describes an application of an optimisation tool that can

be used by communities at several different scales of population: it is thus similarly directed to providing services in user friendly ways to a wide range of end-users. Its emphasis on ease of communication, superimposed upon an already quite highly developed computational capacity, is again characteristic of the ways of working of hydroinformatics within its sociotechnical context.

The fifth paper, and the last in the printed version of this issue, describes a quite other kind of problem again, but one in a field where internet-distributed and mobile-telephony-accessed systems are already commercially operational. The aim in the case presented here is to forecast algal blooms in both time and magnitude with an acceptable accuracy. The results are most surprising in the case presented here in view of the apparently low frequency of sampling of the data that was used to learn the behaviour of the process itself.

A sixth paper is included only in the electronic version of the present issue because of its length. This is a paper about the definitions of terms commonly used in hydroinformatics and the reasoning that lies behind these definitions. It is a response to the use, and all-too-often misuse, of words and expressions in this rapidly expanding subject. It is intended to be of a more general interest, and possible entertainment, to many of our readers.

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REFERENCE

- Horton, R. E. 1933 The role of infiltration in the hydrological cycle. *Transactions of the American Geophysical Union* 14, 445-460.