

THE INFORMATION CYCLE - A FRAMEWORK FOR THE MANAGEMENT OF OUR WATER RESOURCES

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Introduction

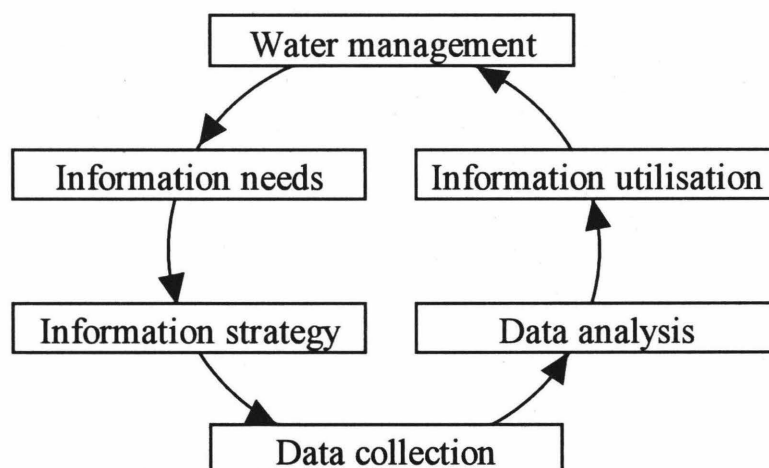
Increasing knowledge of the complexity of processes in water systems has led to a growing demand for information. Next to this, computers provide numerous possibilities to collect and handle data, thus multiplying the availability of data. Then, with the introduction of integrated water management, different aspects of the water system like physical planning, ecology and emissions must be interrelated, with each of these aspects bringing about many data to be considered. Nowadays, in water management information users like policy-makers or water managers are loaded with this information, that may or may not be of use to them.

In this situation, there is a call for less information, better tailored to the information user. Information should no longer be hidden in facts, tables and statistics, but it should be presented in clear, easy to understand pictures, preferably with colours indicating good or bad status. The challenge for the information producers, research and monitoring organisations, is to aggregate available data to accessible, actual, integrated and, above all, tailor-made information.

However, a major problem is to make clear exactly what information is needed. Information users tend to pose questions like 'Is this country safe against flooding?' or 'What will be the consequences of dry years for agriculture?'. On the other hand, the information producer tends to give answers like 'The maximum waterlevel is 34.6 m above mean sea level' or 'pH is 7.8'. These questions and answers reflect different worlds that will have to be linked together through communication.

The Information Cycle

Information producers and information users should jointly specify the information that is needed. As a basis for this discussion, the information cycle (figure) has been developed as a common framework. The information cycle describes the process of information production.



The first and most critical step is to specify what information is needed. The next step is to specify how the information will be produced. The third step deals with the collection of relevant data. After analysis of the data in the fourth step, in the final step information is produced to be used in water management.

Usually at that moment it appears that the obtained information does not satisfy the need.

Reasons for this can be:

- Specification of information need is insufficient;
- The information need as specified is not the factual information need;
- The strategy to collect information has not come up with the right information;
- The obtained information generates new questions;
- The situation has changed (by e.g. new policies), causing other information to be needed;
- New methods have been developed, that until recently were not available;
- The information is not presented in a comprehensive format.

Therefore, new information is needed. This (changed) information need must be determined and the process will start from the beginning. Because we have learned from the previous process, this next cycle should lead to better tailored information.

International Examples

Recently, a series of pilot projects has been started as part of the work of the UN/ECE task force on Monitoring and Assessment. Its objective is to test the applicability of the UN/ECE Guidelines on Water Quality Monitoring and Assessment of Transboundary Rivers, when setting up new small-scale transboundary monitoring programs. A major step in this project is the tailor-made specification of information needs. Defining information needs involves asking many questions until the right questions come up. These questions should be specified further within the framework of the overall water management objectives and should consider the requirements that result from preceding and following steps in the information cycle. Most questions will be related to the specific functions or uses of the water under consideration. However, different functions and uses may have conflicting requirements to fulfil. For transboundary waters an additional complicating factor is the harmonisation of requirements and information needs of all countries involved.

National Information Specification

In 1996, the Dutch Directorate-General for Public Works and Water Management started the project 'Measuring strategy 2000+'. The aim of this project is to develop methods to produce complete information of good quality in an efficient way. One of the activities in this project is to develop a methodology to specify information needs. Some pilot studies in this activity have been carried out. One of the conclusions from these pilot studies was that from different working levels, the people concerned have to be brought together to get a full view of the problem at hand. Next to this, the fourth national policy document on water management is now under preparation. After summer, the existing national monitoring network will be reconsidered in view of this national policy document, starting with specifying the information needs of national policy-makers.

The Role of Indicators

Policy makers and management bodies face the challenge to manage the complex spatial and temporal cause effect chains in watersheds. Sustainable water management asks for an integrated

approach, but different functions and uses of a waterbody may lead to conflicting interests. In this complex of interests, indicators can become increasingly important, since their function is communication, simplification and quantification of information on a system. However, indicators are yet not completely accepted or applied in water management. Partly, this might be the result of a general confusion on what indicators are and the lack of knowledge/experience on possibilities and limitations of the use of indicators. Here we will define an indicator as:

- an observable and measurable quantity/variable/parameter
- representing a phenomenon/(management)process in the environment
- having significance beyond its face value, possibly at a higher aggregation level

The aim of the use of indicators can be:

- reporting state of the environment
- evaluation of effectiveness of policy measures
- comparisons between countries/regions or between functions/uses
- communication tool between policy makers, “monitors“, and the public

In practice indicators will be a result of a compromise between scientific accuracy, concise informativeness and their use for strategic decision making. Besides application of indicators to aggregate information, also visualization techniques can be used, as tables, diagrams, line charts, and maps. When using indicators, one has to take into account, that most indicators are bound to a certain place and time. Its characteristics will depend on:

- spatial scale
- aim
- processes in a system

Rather than recommending the use of certain indicators, we would like to propose a general framework of indicator use/choice, that allows for the development of tailor-made indicators, but also for more compatibility of the outcome. The framework includes issues, functions, uses, target groups, but also parts of the cause-effect chain as pressure, state, impact and response.

Most questions within water management will be related to the specific functions or uses of the water under consideration. However, different functions and uses may have conflicting requirements to fulfill. Since most indicators will be linked to functions and uses, they can be a tool to prioritize the different needs or to integrate requirements linked to the different functions/uses and therefore can be very helpful when specifying information needs.

Conclusions

Summarising, the main principles of the information cycle are:

1. The information need is collectively agreed upon and related to the information utilisation.
This is the starting point for the production of information.
2. The cyclic character guarantees regular evaluation of the gathered information, thus taking care of up-to-date, tailor-made information.

The information cycle offers a framework as a basis for the dialogue between information users and information producers. In several projects, the information cycle is being used as such. However, the major challenge is to specify the information needs to such detail that the resulting information producing system will meet the factual information need. A methodology for this specification of information needs is under development.