4. Flood prévention problems.

Objekttyp: **Chapter**

Zeitschrift: **L'Enseignement Mathématique**

Band (Jahr): **1 (1955)**

Heft 1-2-3: **L'ENSEIGNEMENT MATHÉMATIQUE**

PDF erstellt am: **21.07.2024**

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c) courses for non-mathematicians, *d)* methodological statistical instruction of non-mathematical workers by consultation and by methodological sections in statistical reports on concrete problems.

Consultation is done partly on a non-profit cost-price basis, partly (in particular for university laboratories all over the country) free of charge. It comprises often extensive elaboration of observational results, testing of observational evidence, design of experiments, computing, development in pure and applied mathematics, etc.

Research is done in everyone of the four departments, and comprises also design and construction of computing machines.

In order to give an impression of the variety of subjects treated, a list has been added in the appendix of subjects dealt with in consultation during 1953.

4. Flood prevention problems.

On February 1st 1953 the South Western part of the Netherlands, and, to a lesser extent, parts of England and Belgium, were struck by a flood disaster, which exceeded by far any one hitherto observed. It cost in our country over 1750 human lives and far over 10^9 guilders of material losses. On the other hand it gave rise to one of the finest examples of international helpfulness known in history.

In order to find out the best methods for preventing, in asfar as possible, a similar disaster in future, the government immediately appointed a committee, consisting of the most prominent hydraulic engineers, called the " Delta-committee ", because its realm is the delta, formed by the rivers Rhine, Meuse and Scheldt.

The reason why all this is mentioned in this report is the fact that it gave rise to a number of mathematical and physical problems. For solving them the Δ-committee appointed as advisory institutions: the meteorological institute K.N.M.I., the hydrological laboratory of the Technical University at Delft, the (governmental) Central Planning Bureau and the Mathematical Centre.

Parts of the mathematical problems are being solved in different sections of the Ministry of Public Works itself, in the K.N.M.I., the Central Planning Bureau and the Mathematical Centre. Results and plans for further research are exchanged and discussed in two of the working groups mentioned above. The problems fall into three groups:

1. Statistical problems concerning the frequencies of excessively high floods;
2. Econometric decision problems, concerning the optimal height to which dikes must be heightened, taking account of their cost and of the losses caused by breaks;
3. Mathematical physical problems concerning the question, which types of depressions moving over the North Sea are the most dangerous, and which heightening of the sealevel they may cause.

The third group of problems is of the classical type of applied mechanics (partial differential equations with boundary conditions, reducible to integral equations), though showing many complications. The first two groups of problems are not difficult from a purely mathematical point of view, but require a good deal of " practical logic " to avoid many pitfalls into which one might easily step. A survey of results obtained on the second group of problems has been given by the present author before the 8th European meeting of the Econometric Society at Uppsala; one about the first and third group was given before the International Congress of Mathematicians at Amsterdam.

Together they form one of the most important applications of mathematics to large scale government decisions, ranging over a few centuries in time and a few milliards (" billions ") of guilders (or using the standardized physical terminology: giga-guilders), in the Netherlands.

They also form an example of the sometimes insufficiently stressed fact that modern society has a great need, not only of large scale computing, but also of " large scale mathematics ".