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Abstract: The principles of determining and forecasting 24-hour water demand histograms for specific user groups are discussed, using two different water supply subsystems as examples (in Wroclaw and Klodzko). The applicability of artificial neural networks to the calibration and verification of hydraulic models, as well as to the modeling of flow in water supply systems, has been confirmed. Analysis of the efficiency of artificial neural networks in forecasting 24-hour profiles of hourly water demand in housing estates has revealed a relatively high quality of prediction, which is comparable to, or higher than, the quality of the predictions obtained with models of ARIMA class or with exponential smoothing of the time series. It has been demonstrated that the optimal structures of perceptron networks are not of a complex nature, so the process of their education or re-education does not require long-lasting computations. In the procedures of choosing those structures the delay can be reduced to 5 days of the same category (working days, weekends, national holidays, bank holidays), the number of hidden layers to 1, and the number of neurons in the hidden layer to 15. Neural networks can also be used for calibrating the models of water flow in water supply systems, as well as for computer simulations showing how these systems function. The optimal structures of the networks can be chosen using the packets 'Neural networks' of the software STATISTICA (v. 6 to 8).

Keywords: Water supply system, water demand, modeling, forecasting, artificial neural networks.