CLAIMS

1. A system for monitoring rodents in a sewage system, said system comprising

a plurality of monitoring devices placed in manholes of the sewage system, wherein each monitoring device is provided with one or several sensors configured to detect rodents in the sewage system and to generate a sensor data set, a memory configured to hold an identification code, and a data communications module,

a server comprising a data communications module communicatively connected to the data communication modules of the monitoring devices, wherein said server is configured to receive, from each monitoring device, the sensor data set and the identification code, and based on these data sets identify how populations of rodents move in the sewage system,

wherein the identification code is linked to a position data set, wherein the position data set comprises information about a geographical position of the monitoring device.

2. The system according to claim 1, wherein each monitoring device is provided with a tag provided with a code linked to the identification code.

3. The system according to any one of the preceding claims, wherein the one or several sensors comprises two or more sensors placed at a distance from each other such that a direction of movement of the rodents can be determined.

4. The system according to any one of the preceding claims, wherein the one or several sensors comprises radar sensors, temperature sensors, flow sensors arranged in lateral pipes or a hydrogen sulfide sensor.

5. The system according to any one of the preceding claims, wherein, for each monitoring device, at least one of the one or several sensors is configured as a level sensor such that a water level in each manhole is detected.

6. A monitoring device for monitoring rodents in a sewage system, said device being arranged to form part of the system according to any one of the preceding claims, said device comprising

one or several sensors configured to detect rodents in the sewage system and to generate a sensor data set,

a memory configured to hold an identification code, and

a data communications module communicatively connected to a server.

7. A method for predicting a rodent outbreak in a city using the system according to any one of the claims 1 to 5, said method comprising

collecting sensor data sets from a plurality of monitoring devices placed in manholes or laterals of a sewage system, during a data collection period comprising a plurality of sample time slots,

linking the sensor data sets to the manholes,

detecting rodent activity in each manhole during the sample time slots of the data collection phase, and

forecasting, for a future period, based on the rodent activity determined in the manholes during the data collection phase, when and where rodents are forced out of the sewage system.

8. The method according to claim 8, further comprising

determining water level sensor data in the manholes during the data collection period, and

wherein the step of forecasting, for the future period, when and where the rodents are forced out of the sewage system are based on the rodent activity detected in the manholes in combination with the water level sensor data determined during the data collection period.

9. The method according to claim 8 or 9, further comprising

receiving weather forecast data during the data collection period,

determining a weather forecast-water level relationship between the weather forecast data and the water level sensor data in the manholes during the data collection period,

receiving weather forecast data for the future period,

determining weather forecast water levels for the future period, based on the weather forecast data for the future period and the weather forecast-water level relationship,

wherein the step of forecasting, for the future period, when and where the rodents are forced out of the sewage system are based on the rodent activity detected in the manholes during the data collection period in combination with the weather forecast water levels determined based on the weather forecast data for the future period.

10. A method for identifying a position for placing a trap in a sewage system using the system according to any one of the claims 1 to 5, said method comprising

collecting sensor data sets from a plurality of monitoring devices placed in manholes of the sewage system, during a data collection period comprising a plurality of sample time slots,

linking the sensor data sets to the manholes,

detecting rodent activity in each manhole during the sample time slots of the data collection phase,

identifying a least two candidate positions for placing a trap in the sewage system,

evaluating, by simulation, effects on rodent populations in the sewage system for the trap placed in the at least two candidate positions for a future period, and

selecting a most promising candidate position of the at least two candidate positions by comparing the effects associated with the at least two candidate positions with pre-set selection requirements, and

identifying the most promising candidate position as the position for placing the trap.

11. A method for identifying positions for existing traps in a sewage system using the system according to any one of the claims 1 to 5, said method comprising

collecting sensor data sets from a plurality of monitoring devices placed in manholes of the sewage system, during a data collection period comprising a plurality of sample time slots,

linking the sensor data sets to the manholes,

detecting rodent activity in each manhole during the sample time slots of the data collection phase,

receiving positions for the existing traps,

identifying a least two candidate position data sets for placing the existing traps in the sewage system,

evaluating, by simulation, effects on rodent populations in the sewage system with the traps placed in the at least two candidate position data sets for a future period,

selecting a most promising candidate position data set of the at least two candidate position data sets by comparing the effects associated with the at least two candidate position data sets with pre-set selection requirements, and

identifying the most promising candidate position data sets as the positions for the existing traps.

12. A method for identifying a blockage in a sewage system using the system according to any one of the claims 1 to 5, said sewage system comprising a plurality of manholes connected by laterals, said method comprising

continuously collecting sensor data sets from a plurality of monitoring devices placed in the manholes,

continuously detecting rodent activity in each manhole,

identifying the blockage in a lateral connecting two of the manholes by detecting a decreasing rodent activity in at least one manhole connected to the lateral.

13. A method for identifying a position of an underground leakage in a sewage system using the system according to any one of the claims 1 to 5, said sewage system comprising a plurality of manholes connected by laterals, said method comprising

collecting sensor data sets from a plurality of monitoring devices placed in the manholes over a period of time,

generating a first time series providing rodent activity in each manhole using the sensor data sets over the period of time,

detecting water level sensor data for each manhole,

generating a second time series providing water levels in each manhole using the water level sensor data over the period of time,

identifying the position of the underground leakage in the sewage system by combining the first and second time series.

14. The method according to claim 15, further comprising

detecting water flow data in laterals by using flow sensors placed in the laterals,

generating a third time series providing water flows in the laterals using the water flow data over a period of time,

wherein the step of identifying the position of the underground leakage in the sewage system is made by combining the first, second and third time series.

15. A method for predicting a pest outbreak using the system according to any one of the claims 1 to 5, said method comprising

collecting sensor data sets, such as temperature data, water flow data and/or water level sensor data, from at least one monitoring device placed in a sewage system, during a data collection period comprising a plurality of sample time slots,

detecting pest activity, such as rodent activity and/or insect activity, in the manhole during the sample time slots of the data collection phase, and

estimating, for a future period, based on the pest activity determined in the manhole during the data collection phase, a risk of the pest outbreak.