
Executive summary

Health Council of the Netherlands. Quiet areas and health. The Hague: Health Council of the Netherlands, 2006; publication no. 2006/12.

Issues for advice

Silence is becoming increasingly rare in the Netherlands. But many people nonetheless have a need for areas that are still quiet and calm. Noise is no longer a problem affecting just urban residential areas.* If the government fails to act, 30 to 40 per cent of the official quiet areas and nature reserves and recreation areas will be affected by noise over time, especially road traffic and aircraft noise.** The underlying causes are growing mobility and sprawling urban and infrastructural development.

Without specific policy spearheads, the spatial variation between activity and silence emphatically targeted by spatial planning policy will vanish under a noise blanket spreading across the Netherlands. Areas close to cities where people can enjoy peace and quiet will become ever scarcer in future. People will have to travel greater distances to spend their free time in quiet, outdoor surroundings.

And that is not the only consequence. There are also signs that this trend might affect people's health. Much is already known about the negative impact of noise pollution. But what are the health benefits of quiet? This advice summarizes the available knowledge on the potential connection between quiet areas and health, in terms of the following three questions:

* 'Noise' is defined here as 'unwanted sound'.

** The chosen threshold is 40 dB(A).

- 1 What information is available on the health benefits of areas free from noise inside and outside cities and what additional research is required?
- 2 What information is available on the need for quiet areas inside and outside cities and what additional research is required?
- 3 What are the best criteria for testing the acoustic quality in comparatively quiet areas inside and outside cities for their capacity to prevent or limit the disturbances to the enjoyment of silence?

Harmful health effects of noise

The first step is to ascertain the harmful effects of the counterpart of silence: noise. If these exist, it is self-evident that silence can prevent the harmful effects on health that can be caused by noise.

Many people are annoyed by noise, particularly traffic and aircraft noise, in urban residential environments. Seventy percent of Dutch homes have an average noise exposure of more than 50 dB(A) over a 24-hour period. Considerable research has been undertaken into the harmful health effects of noise in residential environments. Continuous exposure to noise induces stress responses and can contribute to the development of cardiovascular diseases. Sleep disorders also occur, and aircraft noise has a harmful effect on the performance of children at school. Although the uncertainties involved in the relevant calculations are substantial, if policy remains unchanged, noise exposure (and consequently the burden of disease among the Dutch population as a result of exposure to noise) will continue to increase.

Less research has been carried out into annoyance and disturbance of quiet in green spaces for leisure purposes. People visiting a number of investigated official quiet areas in the Netherlands report a limited loss of enjoyment of peace and quiet as a result of noise. However, quiet areas comprise only a small part of the green spaces used for recreation that are visited by large numbers of people. Results from a national survey 'Belevingsmonitor Rijksoverheid' [National Experience Monitor] show that around 40% of Dutch people think that traffic noise that they notice while spending leisure time in nature reserves is a problem that needs to gain more priority in the policy agenda.

Only a limited number of surveys conducted in large national parks in the United States have established quantitative relationships between exposure to, in particular, aircraft noise and impairment and disturbance of enjoyment of peace and quiet on the part of visitors to the parks. Although many factors affect these relationships, the results do indicate that the target value of 40 dB(A) laid down

in the Dutch policy for green spaces used for recreation does not fully guarantee undisturbed enjoyment of peace and quiet.

Health benefits of spending time in a quiet area

Spending time in a quiet area can probably have a beneficial health effect in two ways. First, it can help restore or compensate for the adverse health effects of noise in the residential environment. Second, exposure to low levels of sounds regarded as pleasant (wanted sounds) can have its own, direct beneficial health effect.

Very limited research into the health benefits of quiet areas in and near homes suggests that a quiet side of a home, but also a comparatively quiet wider area near the home, reduces the annoyance by noise in the direct living environment. It is not inconceivable that health benefits can be obtained by spatial variation in noise levels. A residential area can for instance be designed to produce marked differences in noise levels, for instance between the front and back of a home or between an enclosed yard, square or park and busy surrounding roads.

No research has been performed into the beneficial health effects of being able to listen without disturbance to natural or other wanted sounds in green spaces used for recreation. Presumably, (wanted) sound is an important factor in the 'restorative effects' of spending time in or having a view of a green environment that was described in an earlier report by the Health Council. It is not inconceivable that wanted sounds can aid this recovery from stress and restoration of attention and that, conversely, disturbance and impairment of the enjoyment of peace and quiet in green spaces used for recreation may well diminish or even eliminate these 'restorative' effects.

People who are sensitive to sound will probably benefit most from quiet areas inside and outside cities. People who describe themselves as sensitive to sound are not only more annoyed by noise, but are often also more sensitive to other stress factors. People with mental disorders (such as autism, schizophrenia and ADHD) are sometimes also sensitive to sound, often without being aware of this themselves.

The heightened sensitivity to noise of these two groups does not mean that only they would stand to benefit from quiet areas. Other groups can likewise derive special benefits from quiet areas. This applies for instance to people with stress-related afflictions (such as *burnout*) and groups in the large cities. They are not only exposed to high levels of unwanted noise in their residential environment but also to a multiplicity of other physical and social stressors. They can be extra sensitive to noise in those circumstances.*

Demand for quiet areas

In addition to the experience monitor referred to earlier, another survey (based on a questionnaire) indicates that a large group of people attaches importance to actual or potential enjoyment of peace and quiet, and has an actual need to visit quiet areas. It is not known whether people in fact take action on this need and venture out to seek silence. The absence of noise is a significant factor, but visual features in the environment are often regarded as equally or even more important.

People living in noisy areas appear to have a greater need for areas offering quiet than people not exposed to noise at home: near Schiphol Airport, almost twice as many people state a need to visit quiet areas in their immediate vicinity than in the nation-wide sample. It is not known whether people have a daily need for silence or only in the weekend and whether some groups, for instance those sensitive to noise, have a greater need for quiet than others. Also, scant research has been undertaken so far on the importance of quiet in people's decisions to visit or avoid a specific natural or recreational area.

Assessment of the acoustic quality of quiet areas

Research into people's experience of quiet when visiting green recreational spaces shows that numerous factors affect the relationship between their exposure to noise and the disturbance of quiet they experience. An assessment based exclusively on (average) noise levels accordingly provides only a limited reflection of what is experienced as quiet and what can disturb such quiet. Additional criteria are plainly required to take account of those factors. Which potential criteria are identifiable on the basis of the experience survey?

Visitors of green recreational spaces regard as undesirable those noises produced by traffic and industry and more incidental sources of noise (mopeds and small motorbikes, trail bikes, military exercises, construction work) that also play a part in residential areas. The extent of their annoyance with these unwanted noises depends however on personal factors and the situation in which the noise occurs, for instance the type and designated purpose of the area and the type of recreational activity.

* This situational sensitivity to noise is not the same as the sensitivity referred to earlier, which is linked to hereditary factors and probably also to specific psychological afflictions.

Besides the distinction between wanted and unwanted noise, the experience survey provides various other indications of suitable criteria. For instance, the percentage of time during which a disturbance is audible seems to have more influence on the visitors' experience of quietness than the actual noise level. This is true primarily for non-continuous noises, such as a car passing through an otherwise quiet area. Accordingly, various types of sources of noise have to be taken into account; in particular, the distinction between continual, diffuse sources of sound and more variable, 'incidental' sources of sound or sound events appears to be an important one. Research carried out for example by the Natuurkundewinkel [Natural Science Shop] in Groningen emphasises measuring and listening instead of calculations. This makes it possible to draw a distinction between local or large-scale sounds and continuous or more variable sounds.

Additionally, the type of area concerned plays a part. The complexity in relationships between sound and the silence or disturbance of quiet experienced by visitors to recreational areas can be partly resolved by drawing a distinction between nature reserves, green spaces in the countryside, green spaces in cities and quiet built-up areas in cities.

While these factors could prove useful as criteria in an assessment system, at present there is not sufficient expertise to set up this kind of complex system. The Netherlands Organisation for Applied Scientific Research TNO assessment system Ruris is a method for quantifying the acoustic quality of green spaces for recreation. It is useful mainly for areas dominated by a few major sources of sound (motorways, railways or industry). Ruris calculates the cumulative distribution of $L_{eq,24h}$ -values over a year (the percentage of days in a year that an average noise level per day is just exceeded or not). The choice of assessment criteria and range of possible associated thresholds is still open.

This assessment based on average noise levels per day is probably too selective for areas where mainly local and more variable sources of sound determine the level of annoyance by noise and disturbance of quiet. This requires an other, new criteria to be applied, namely the length of time during which an unwanted sound exceeds an acceptable 'level of quiet' or background level. It would also appear to be useful to explore potential masking by natural and appropriate background sounds. An unwanted sound that is inaudible as a result of masking is not annoying.

Conclusions and recommendations for research

While little research has as yet been carried out into the health effects of silence, it is easily conceivable that a quiet environment may compensate annoyance and

stress caused by noisy home and work environments. The absence of noise can moreover be a major factor in the stress-alleviating effects of a natural, green environment. Preferably, these areas should be available close to home, to ensure that annoyance and opportunities for recovery are not too far apart and can be reached by as many people as possible. Therefore quiet spaces in towns are important as well.

The present limited knowledge of their health benefits notwithstanding, a greater focus on the importance of (small) quiet areas in cities and in the direct vicinity of urban residential areas is justified. A large group of people has a need to visit quiet areas. Creating opportunities to be exposed to quiet in their residential environment will make it easier for people to experience and integrate moments of quiet and tranquillity in their daily lives. The creation of areas and places in towns that address this need requires an interdisciplinary approach, with landscape architects and urban planning experts incorporating acoustic knowledge and criteria into their design and construction plans.

Municipalities, provinces and the government will in practice, partly as a result of new European legislation, increasingly have to apply substantiated, uniform and transparent methods to assess noise in quiet areas. The approach proposed here needs to be further developed and already-developed methods need to be applied in practice to test their usefulness.

At the same time, policy decisions are called for. What level of disruption or annoyance is acceptable in quiet areas? Does it have to be quiet there every day or every hour, enabling all visitors to enjoy it, or is some degree of variation acceptable, for instance depending on weather conditions?

Not only quantitative knowledge is important in this respect. Qualitative knowledge and the experience of people “in the field” can likewise make a major contribution to the debate on the social significance of exposure to and the enjoyment of silence and the importance of quiet areas. Quiet areas outside as well as inside cities require some degree of priority and protection, not only because of their potential health benefits but also because, apart from that aspect, they are of substantial social value. Designating “monuments of silence” can help make the general public aware of the importance of silence.