NOISE/NEWS INTERNATIONAL

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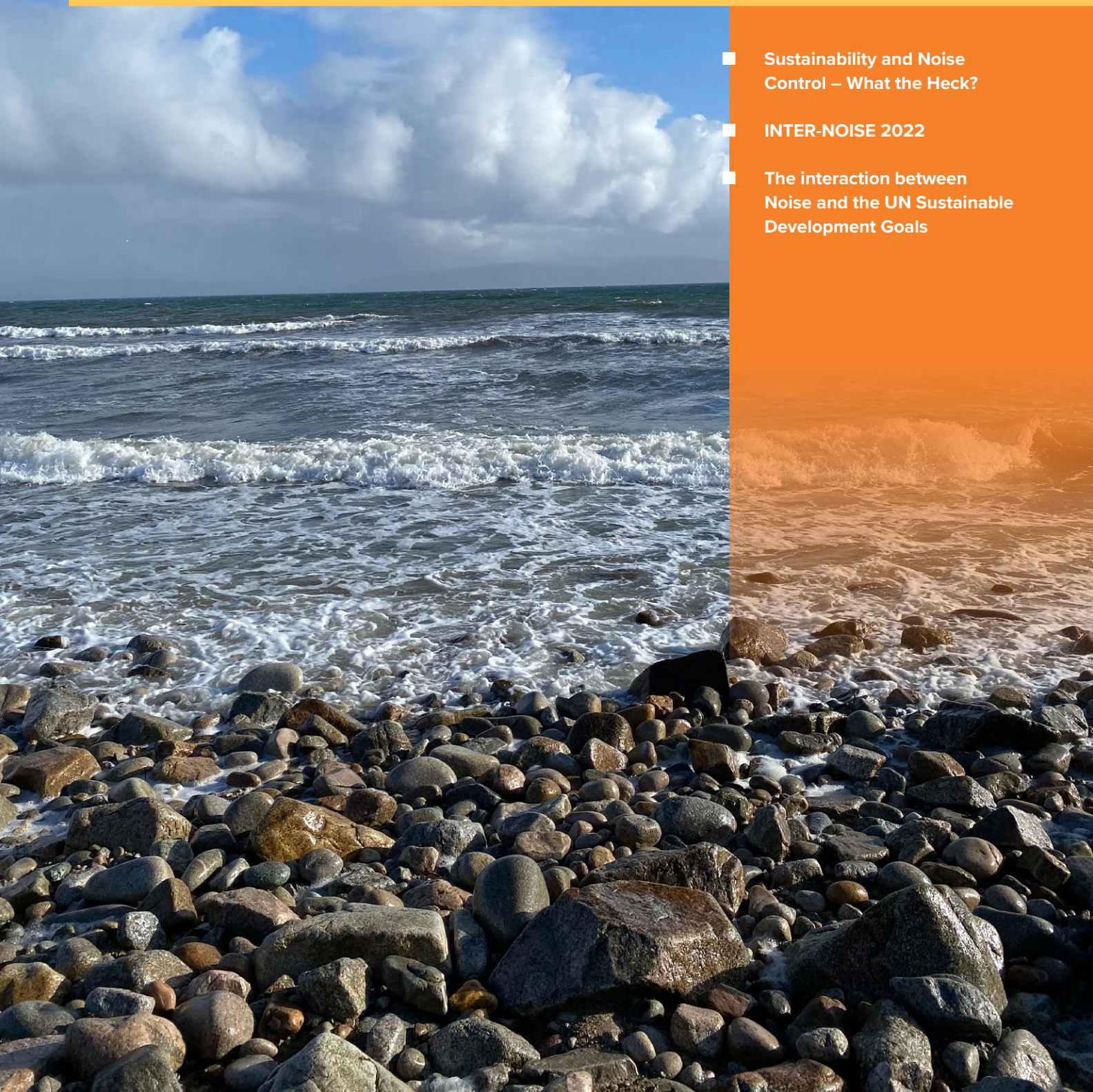

- Sustainability and Noise Control – What the Heck?
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Volume 30, Number 2 **2022 June**

FEATURES

DEPARTMENTS

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NOISE/NEWS INTERNATIONAL

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INCE-USA

The Institute of Noise Control Engineering of the USA (INCE-USA) is a nonprofit professional organization incorporated in Washington, DC, USA. The primary purpose of the Institute is to promote engineering solutions to environmental noise problems. INCE-USA publishes the technical journal *Noise Control Engineering Journal* and with I-INCE publishes this quarterly magazine and its blog. INCE-USA sponsors the NOISE-CON series of national conferences on noise control engineering and the INTER-NOISE Congress when it is held in North America. INCE-USA members are professionals in the field of noise control engineering, and many offer consulting services in noise control. Any persons interested in noise control may become an associate of INCE-USA and receive both this magazine and *Noise Control Engineering Journal*.

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Welcome to the June 2022 issue of Noise/News International.

Eoin A. King Ph.D.

The countdown to INTER-NOISE 2022 is on... We hope to see you all for a return to in-person conferences in Glasgow in August. It promises to be a great conference, with over 800 papers, and several plenary and keynote lectures – all the details are available in this issue of NNI. And, if you can't make it on person, you can still join for over 60 hours of live online sessions! It's also worth noting that the congress theme, 'Noise control in a more sustainable future', is particularly timely and the congress venue is the same as that for the recent conference on climate change, COP 26.

In light of the theme on sustainability, our *From the Archives* feature in this issue recall's the keynote address delivered by Tor Kihlman at INTER-NOISE 2005, who considered the noise issue in the context of sustainable development in an urbanizing world. It makes for an interesting read almost 20 years later.

Elsewhere in this issue, I'm happy to introduce a brand-new feature called "What is all the noise about?". Here, I've invited regular NNI contributor, and NCEJ Editor, Dr. Jim Thompson to offer his thoughts on a hot topic in the field of noise control. In this issue he discusses noise and sustainability. We would very much welcome your thoughts on the topic as well – so please feel free to send me your comments (kingea@tcd.ie) and we'll publish a selection of the feedback along with Jim's column in the next issue of NNI. We are looking forward to hearing from you.

I hope you enjoy this issue of NNI, and I hope to see you in Glasgow!

What is all the Noise About?

Editor's note: Why are workers still experiencing hearing loss? Did you hear about how some manufacturers make products noisier to make them sound more pleasant? Is noise control still a good description of what we do? These are all some key questions to our noise control community. To tackle these and other issues, we've teamed up with Dr. Jim Thompson – former President of INCE-USA and Chairman of the SAE Noise and Vibration General Committee. He's also the former NNI Managing Editor, and is currently the Editor of the Noise Control Engineering Journal. Each issue, Jim will offer his thoughts on some key questions related to noise control, and we'd like to invite you to get in touch and let you know what you think. If you'd like to submit a response to Jim's column, please email me at kingea@tcd.ie. For this issue Jim tackles the issue of sustainability and noise control.

Sustainability and Noise Control – What the Heck?

Jim Thompson

Noting that the theme of the INTER-NOISE 2022 Congress is *Noise Control in a More Sustainable Future* made me think about what sustainability is and how the heck is it related to noise control.

Early in my career, I worked to develop a blow-down silencer and sustainability meant a silencer that would last over time and would not disintegrate when it was needed. This is what I think of when someone talks about sustainability related to noise control.

However, the current concept of sustainability is far broader and more complex. Sustainability is now better defined as "the ability of societies to maintain and improve quality of life while preserving both the quality and availability of their natural resources." Clearly, this is much broader than my original dilemma.

Frankly, this definition may be too broad to be useful. I think sustainability has become one of those terms that everyone uses, and everyone has a different meaning for it. If you ask the public, you will probably hear about preventing or slowing climate change or about maintaining equipment.

How does noise control fit into sustainability? The simplest answer is that we must design noise control solutions that are effective and continue to work in the operating environment. But there is more than that. Noise control impacts the quality of life for humans and other animals on the planet. I could make a long list including hearing loss, sleep disturbance, stress and health issue due to environmental noise, habitat disruption of high noise levels, design of performance spaces, etc. Quality of life is an important part of sustainability. On the other hand, controlling global warming while decimating the quality of life for humans and other species is not a solution.

Going back to the public, if you asked whether noise control was a part of sustainability you would probably get more questions than positive responses. To distort an old phrase "noise control gets no respect". Often noise control is seen as a necessary evil or something "only done for aesthetics" – many engineers seeing aesthetics as that unimportant touchy-feely stuff. We must get beyond these old stereotypes and see noise control as enhancing the quality of life on this planet. I have a standard answer to anyone who balks at this "grandiose" definition: talk to a retired miner or factory worker who cannot communicate with their grandchildren, and their tears will demonstrate the importance of quality of life and the impact noise control can have.

So, if noise control is important in preserving and improving the quality of life and quality of life is an important part of sustainability, how do we better define our role and demonstrate our importance as noise control engineers? We cannot depend on legislators or regulators to do this for us. They have been unable to provide workable noise regulations in most cases and have shown themselves unable to get ahead of the global warming issue.

One of the concerns I have is that noise control engineers often under value the work they do. In talking to automotive NVH engineers whose noise improvements are incorporated in millions of cars sold each year, they consistently do not feel what they did was important in terms of quality-of-life impact. We need to demand "respect" and make noise control a part of the sustainability discussion.

How do we do this? I do not have a magic solution and doubt there is one. We must continue to reduce noise and improve the quality of life, but we must also be involved in the discussion of sustainability and our role. This is a large-scale discussion that includes technology, politics, prioritization, money, and societal perceptions of the issues.

I would like to hear what you think about this issue, and how you believe noise control can earn its rightful place in sustainability considerations.

Upcoming Conference: NOVEM 2023

Noise and Vibration: Emerging Methods

NOVEM 2023 is the 7th in the series of NOVEM conferences. The conference will be a major gathering of specialists, from research establishments and from industry, working in the areas of noise and vibration. The emphasis of the conference is on new and emerging methods, techniques and technologies in acoustics and vibration.

In 2023 it will be held in Auckland, New Zealand, at the Owen G. Glenn Building in The University of Auckland's Business School. With state-of-the-art teaching facilities and sweeping views of the Auckland Domain and Rangitoto Island, the Business School offers a unique location for conferences and learning.

About Auckland

With an irresistible combination of magnificent natural scenery and a vibrant city lifestyle, Auckland is a place of exciting contrasts and endless adventures. While you're here, take the opportunity to experience the beautiful scenery, world-class shopping, fine food and wine, rich culture, buzzing cosmopolitan lifestyle, action and adventure.

Important Dates:

Submissions are now open and the following key dates apply:

Non-Peer-Reviewed Papers: Abstract Deadline (200 words): 31 July 2022

Peer-Reviewed Papers: Abstract Deadline (200 words): 30 June 2022

Further Information:

For further details please check out the conference website: https://www.novem.ac.nz.

From the Archives: Sustainable Development in an Urbanizing World – the Noise Issue

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As you know, the 51st INTER-NOISE Congress and Exposition (INTER-NOISE 2022) later this year will mark a return to in-person conferences. We are all very excited for this one! The conference theme this year is "Noise Control in a More Sustainable Future". So, for this issue's From the Archives feature, we decided to re-issue an edited version of the keynote paper presented by Tor Kihlman at the opening session of INTER-NOISE 2005 in Rio de Janeiro, Brazil on 2005 August 08. This article was first published in NNI in the March 2006 issue.

Introduction

Rio de Janeiro was the venue for the World Summit on Sustainable Development in 1992. This important conference, UNCED (UN Conference on Environment and Development), had as a background the Brundtland Commisson Report, *Our Common Future*. It resulted in the Rio Declaration and Agenda 21. Considering the theme of INTER-NOISE 2005, *Environmental Noise Control*, and the venue, Rio de Janeiro, a natural choice for a keynote at the opening of the this INTER-NOISE Congress is *Sustainable Development in an Urbanizing World - the Noise Issue*. This paper is restricted to road traffic noise.

In discussions and plans regarding the environment and sustainable development, the noise issue is often neglected; the documents from the UNCED conference are no exception. This is very remarkable, because noise is considered by the World Health Organization (WHO) to be the 3rd most hazardous pollution (air, water, noise) in large cities. Also, it is stated in several European Union (EU) documents: "Noise is one of the environmental pressures that is closest to the citizens. In public surveys, problems with noise are rated at the highest level together with global warming."

Road vehicles, rail vehicles, and airplanes are simply much too noisy—even when complying with international standards—so when used in today's mass transport the total noise emission gets much too high to comply with a sustainable development. This is a major problem for all cities in developed regions; it is still worse in less developed regions.

	Population (in billions)				
Major area	**1950**	**1975**	**2000**	**2003**	**2030**
Total population					
World	2.52	4.07	6.07	6.30	8.13
More developed regions	0.81	1.05	1.19	1.20	1.24
Less developed regions	1.71	3.02	4.88	5.10	6.89
Urban population					
World	0.73	1.52	2.86	3.04	4.94
More developed regions	0.43	0.70	0.88	0.90	1.01
Less developed regions	0.31	0.81	1.97	2.15	3.93
Rural population					
World	1.79	2.55	3.21	3.26	3.19
More developed regions	0.39	0.34	0.31	0.31	0.23
Less developed regions	1.40	2.21	2.90	2.95	2.96

Table 1. Distribution of global population. Source: United Nations Population Division. World Urbanization Prospects, The 2003 Revision.

The Urbanizing World

Table 1 shows some statistics concerning the global population. Approximately one-half of the population now lives in urban areas, and the fraction is increasing. There are also huge differences between the more developed regions and the less developed. Table 2 shows examples of population densities in different urban areas, with Los Angeles and Dharavi, Mumbai as the extremes.

Comments on Terminology

When dealing with environmental issues, especially noise, we have to distinguish very clearly between two concepts—*emission* and *immission*. (Cf. emigration and immigration)

Emission describes the noise output from the source. *Immission* (originally a concept from Roman law on real estate property rights) describes how much noise that reaches the neighborhood. The immission is a function of the emission (in our case determined by the amount and speed of the traffic, the characteristics of the vehicles, the road surfaces), the city structure (the road network, building sizes and positions), the type of ground between traffic routes and buildings, the plans of the dwellings, and—for indoor noise—the sound insulation of the building façades (when windows are closed!). It is the immission that determines the adverse effects of noise.

Many environmental problems have been solved, or can be solved, entirely by

Table 2. Examples of urban population densities.
(based on Satterthwaite 2004 & USK/Stockholm 2004, Nnaggenda-Musana 2004)

Urban area	Urban population density
Dharavi, Mumbai (Bombay)	2,400 p/ha (0.5 m inhabitants in 2.1 sqkm)
Beijing "Core City"	342 p/ha (5.4 m inh in 158 sqkm)
Mexico City, central area	140 p/ha (1.9 m inh in 139 sqkm)
Mexico City Metropolitan Area	32 p/ha (15 m inh in 4,636 sqkm)
Tokyo central city	137 p/ha (8.2 m inh in 598 sqkm)
Tokyo prefecture	55 p/ha (11.8 m inh in 2,162 sqkm)
Dar es Salaam	45-130 p/ha (in the period 1891-2001)
Kampala	75-94 p/ha (1.6-2 m inh in 21,300 ha)
Greater London	40 p/ha (6.4 m inh in 1,579 sqkm)
Stockholm	40 p/ha (0.76 m inh in 187 sqkm, lakes excluded)
Stockholm modernist housing areas of 1950s & 1960s (FAR 0.5-0.7)	30-60 p/ha
Stockholm inner city 'stone town' (FAR 1.5-2.4)	260-290 p/ha
Los Angeles Consolidated Metropolitan Statistical Area	1.7 p/ha (14.5 m inh in 88,000 sqkm)

emission reductions. This is not the case for most noise problems. There are no end-of-the-pipe solutions other than in special cases. To reduce noise emissions from different sources is a difficult and time-consuming engineering task. This is why noise problems have to be tackled through measures both on the emission and the immission side.

On the immission side, environmental noise is mostly characterized by an A-weighted equivalent level, L_{Aeq}. The time period for the averaging is mostly 24h or 8h. An additional descriptor sometimes used, is L_{Amax}. L_{Aeq}, with a day/evening/night weighting of +5 dB for the evening and +10 dB for the night, called L_{den}, is used in the EU. In the United States, L_{dn} is widely used. L_{dn} has a +10 dB weighting for the night. Relations for typical traffic distributions over the 24 hours:

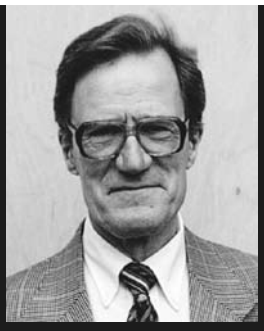
$$L_{den} \approx L_{dn} + 1\text{dB} \approx L_{eq,24h} + (3 \text{ to } 5)\text{ dB}$$

The actual immission levels also depend upon reflections from building façades close to the receiver. Therefore, in many noise regulations, limit or guideline values are given as free field levels, i.e., the levels as if there were no close-by buildings, with the approximate relation that the level at some distance from a façade (>2m) is 3 dB higher than the free field level.

When dealing with environmental noise regulations, measurements, predictions or mapping, it is important to distinguish very clearly between these concepts. Unfortunately, this is not always the case, resulting in some uncertainty and confusion in comparisons between data from different publications.

Adverse Effects of Urban Noise—Acoustic Demands Upon a Sustainable Development

Environmental noise has several adverse effects. The following specific health effects have been identified (Berglund/WHO 2000): interference with communication, annoyance responses, and effects on sleep, psycho-physiological symptoms, performance, productivity, and social behavior. Newer findings also show, that typical environmental noise levels in cities is a risk factor for cardiovascular disease[1]. Noise is especially a problem for the economically weak portions of the populations.



Tor Kihlman received his Master in Electrical Engineering from Chalmers University of Technology, Gothenburg, Sweden, and his Doctorate with a thesis on sound propagation in buildings from the Technical University of Lund, Sweden (1967). He began his professional career in acoustics at Chalmers University of Technology, moved for a few years to Lund University of Technology, and then returned to Chalmers in 1969 as professor in building acoustics. Since 1999 he has been an emeritus professor. His research interest has been in airborne and structureborne sound in buildings and occupational and environmental noise. He has been a member of Swedish Parliamentary investigations and a one-man investigator for the Swedish Action Plan against Noise (1993)

He is a fellow of ASA and a member of the Royal Swedish Academy of Engineering Sciences as well as member of several other professional societies. He has been vice president of his university. He has also been Chairman of the International Commission on Acoustics and President of I-INCE.

Table 3. WHO guidelines for community noise.

Specific environment	Critical health effect(s)	L_{Aeq} (dB)	Time base (hours)	L_{Amax}, fast (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Outside bedrooms	Sleep disturbance window open (outdoor values)	45	8	60

Sustainable development demands that these adverse effects are reduced to a minimum. The studies of the effects show very clearly, that to be negligible, it requires that L_{eq} be below 45-50 dB. This is reflected in the WHO guidelines (See Table 3). These are the demands that should be requirements for sustainable development.

Actual guidelines are less ambitious. As an example, the Swedish guidelines are given in Table 4. Similar values can be found also in the regulations of many other countries. The Swedish guideline values were set more than 30 years ago as a long-term goal. From the beginning, the goal was regarded as a technical/economic compromise, and not as a goal guaranteeing a good environment, but an acceptable one. It was believed that these levels could and would be reached within a foreseeable future. Today, this long-term goal seems more remote than it did when first formulated. The inertia of the manufacturers, the values promoted on the car market, and the strength of the industries' lobby organizations were totally underestimated.

Table 4. Swedish guideline values for new dwellings. Free field values.

	$L_{Aeq,24h}$ (dB)	L_{Amax} (dB)
Outdoor	55	70
Indoor, closed windows	30	
Indoor, closed windows, Night		45

$L_{Aeq,24h}$ dB corresponds approximately to 57 dB daytime and 48 dB nighttime.

The Noise Situation

Typical levels are substantially higher than those demanded for a sustainable development. Levels around 65 dB are not rare, a level at which the adverse effects of all the above mentioned kinds are severe. In many cities, still much higher levels are common. The situation is definitely not in harmony with a sustainable development. Below is a view of the environmental noise situation in some cities.

Some Theoretical Calculations

At the ICA congress in Seattle in 1998, together with Wolfgang Kropp, I gave a paper based on statistical traffic data for 31 major cities around the world.[2] Our surprising observation was that all these cities, according to our calculations, had approximately the same average traffic work per unit urban area, $2.7*10^7$ vehicle-km/km^2 and year, see Fig. 1. This follows from the well-known observation that all streets and motorways in urban areas get filled with traffic - a consequence of common human behavior. This also implies that the noise power emitted per unit urban area is approximately the same in all these cities if the road surfaces have similar acoustic properties and the speeds are similar.

So, for the traffic noise situation, sprawling the city does not help! The sprawled city is not— on average—quieter than a compact city. The method commonly used to decrease noise levels—increased distance between the source and the receiver, the equivalent to tall chimneys to decrease air pollution—is not very effective when used extensively. In fact, it is counter-productive. It leads to urban structures that are not desirable for a sustainable development for several reasons—land use, fuel consumption, etc. So, there is often not a conflict between different environmental interests. The task is to identify win/win solutions that lead to less noise, better traffic safety, less CO_2 emissions, etc.

The average calculated noise exposure of buildings facing the streets—based on the traffic and traffic network data and a simplified flat city model with a regular street pattern—was $L_{Aeq,24h}$ = 60 - 65 dB (free field).[2] In the calculations, it was assumed that vehicles and road surfaces were in good condition. The calculated levels are also in accordance with many measurements and detailed surveys in European cities. Only at some distance

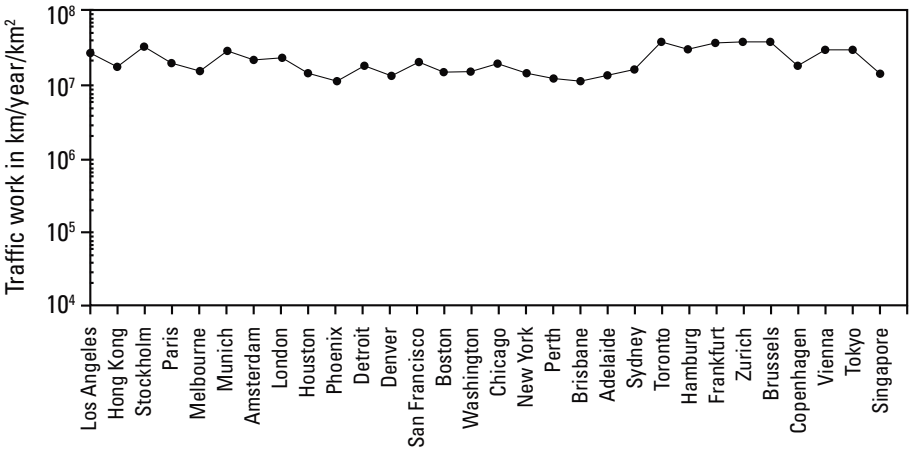


Figure 1. Total traffic work in private car equivalents.[2]

from a street, behind shielding buildings, the levels may be below 50 or 55 dB.

Traffic Noise Data for Gothenburg

As an example, Table 3 shows data for Gothenburg, Sweden, a city with 0.5 million inhabitants. The levels are calculated, free field values. Calculated levels show a good agreement with measurements in a number of control points.

Comparing these data with the Swedish long term goal in Table 2, we see a gap of approximately 10 dB. However, in all new planning and new dwelling buildings, efforts are made to fulfill the guidelines, which certainly is difficult. It is also a problem for political credibility to argue for these guidelines to be applied to new dwellings, referring to health reasons, and not being able to do much about the existing noisy situations. And still, there is a gap of at least another 5 dB between the guidelines and levels representing a good environment.

Table 3. Distribution of calculated traffic noise levels for 1636 sites in Gothenburg, Sweden.

$L_{Aeq,24h}$ (dB)	Number of sites	Percentage %
<50	80	5
50-55	224	14
55-60	560	34
60-65	495	30
65-70	228	14
70-75	44	3
75-80	5	0.3

If we apply well-known dose-response relations and consider typical urban plans and building designs, it can be estimated that in these cities we get approximately one or two annoyed persons per each 100 vehicle-km/day, differences depending upon differences in city structure and traffic network. Those, who both live in and drive in the city suffer from the noise that they cause when driving. The sleep disturbance is considerable. Today's traffic noise is much too high to fulfill demands on a sustainable development.

It must be noted, that this noisy situation, described above, concerns major cities in Europe, North America, Australia and Japan, parts of the world with a similar economic situation. The car fleet as well as the roads are, in general, in good condition. Nevertheless, the situation is such that it is, in practice, often impossible to build new dwellings fulfilling demands on reasonable, good acoustic environment in these urban areas. Exceptions from guidelines/ recommendations are therefore common. One conclusion is that there is a severe inbalance between emission requirements for new vehicles and reasonable demands on noise immission.

It is often said, not least by politicians, that measures at the source are the most cost-effective way to solve noise problems. However, every attempt to strengthen the requirements on cars, tires, and road surfaces is usually met with enormous resistance. The lobbying from the emitting side—the vehicle and tire manufacturers' organizations—is very effective and the result is that no political decisions are taken to decrease the emissions .

However, the immision situation in many other cities is still worse, not least in less developed regions. I will give two examples, Curitiba in Brazil and Cairo in Egypt.

Some Noise Data for Curitiba

Curitiba is located south of Rio de Janeiro. It is a city, which has undergone a remarkable growth and simultaneous development to improve the conditions for its citizens to give them a good environmental quality. Curitiba now has 1.5 million inhabitants. It has, for several years, stood as an international model for excellent city planning and governance. This is, to a high degree, due to the architect/planner and—through many years—mayor of the city, Jaime Lerner, later governor of the state of Parana. But in Curitiba, the noise environment is not very good. The data in Table 4 have been published by Zannin et al.[3]

Table 4. Distribution of measured $L_{eq,2h}$ values (daytime) for 1000 sites in Curitiba.[3]

$L_{Aeq,2h}$ (dB)	Number of sites	Percentage
<50	7	0.7
50-55	30	3
55-60	15	1.5
60-65	15	1.5
65-70	127	13
70-75	403	40
75-80	321	32
80-85	82	8

These data are 2-hour measurements and, with such a sampling of measurement points, comparisons with the data from Gothenburg cannot be done directly. However, corrected for the method differences, it seems that Curitiba is almost 10 dB noisier than Gothenburg.

It is noteworthy, that the noise limits set by the city authorities in Curitiba are as ambitious as those in Sweden, as illustrated in Table 5. The gap between goals and reality is still wider in Curitiba than in Sweden.

Table 5 Noise limits in Curitiba, dBA. Law 8583-1995 (There is a later revision).[3]

Zone	Day, 0700-1900	Evening, 1900-2200	Night, 2200-0700
Residential	55	50	45
Mixed	60	55	55
Services	65	60	55
Downtown	70	60	60
Industrial	70	60	60

The noisy situation in Curitiba as well as in other large cities in Brazil is explained by the following factors.[4]

1) The bad conditions, in general, of the urban streets;
2) The poor maintenance of the circulating vehicles: cars, buses, motorcycles.

It is not rare to find circulating vehicles with a damaged exhaust system or even without any exhaust system.

3) Generally the circulating vehicles are old. The average age of Brazilian vehicles is 14 years.
4) The bad habits, in general, of the Brazilian drivers:

a) Using the horn for any purpose, with or without apparent reason to do so.
b) Accelerating the vehicle during traffic jams or while waiting for green light.
c) High speed driving inside urban regions. It is not rare to find people driving over 80 km/h.

Some Noise Data for Cairo

Road traffic noise measurements and social surveys to determine the annoyance reactions have been performed by Ali *et al*. in Cairo.[5] Measurements were made at 21 sites covering different types of roads with different width, number of vehicles/hour, and speed. The results are shown in Table 6.

A social survey was carried out simultaneously with the noise measurements and at the same sites. The results are given in Fig. 2.

The results indicate, that the noise levels in Cairo are still higher than those in Curitiba. Nevertheless, Egyptian noise standards (Egyptian Environmental Number 4 Law from 1994) on the maximum permissible limits, given as Leq-values for day, evening and night and for different land use areas are even more ambitious than those in Sweden.6 So, the gap between goals and reality is still wider. The explanations for the bad situation are similar to those in Brazil.[6]

The results from the social survey in Cairo are in good agreement with other surveys. See Fig 2. Obviously, the fraction of people annoyed by the traffic noise in Cairo must be very high.

Discussion and Conclusions

Detailed comparisons between the noise situation in the different cities discussed here cannot be made based on available data. Such comparisons need very detailed knowledge of the immission situation especially in the residential areas, and it is not known to the author of this paper how representative the measured levels are in this respect. In the data for all the three cities exemplified above, high level locations are probably over-represented. Accurate noise mapping including quiet areas is therefore an important part of the work initiated by the EU-directive on environmental noise.[7] With these mappings, it will be possible to make more accurate comparisons between the environmental noise immission in European cities. For strong and firm global noise policies, representative data are also needed from other countries.

But it is quite clear that the gap between actual noise levels and the goals for a sustainable development is very wide, both in developed and less developed regions. This often leads to problems for political credibility—political goals differ too much from what is done to improve the acoustic environment where it is bad.

A long-term devoted effort is needed to make things substantially better. Actions are required on different levels. One obvious task is to change the traffic culture: ban horn use and loud music in cars, strict enforcement of speed limits, etc. Another task is maintenance of vehicles. A reasonable demand is mufflers in good condition under all circumstances. More modern cars and better road maintenance depend on the private and public economy and upon the priority given to the condition of the traffic system. Many of the required improvements here are also essential for better traffic safety. Good governance is a prerequisite.

But even with excellent town planning and the traffic system in good condition, technically as well as culturally, the immission levels cannot be brought down to fullfil the requirements of sustainable development because the noise emissions from today's vehicles are much too high. A lot has to be done to get a more reasonable balance between emission and immission requirements. Road vehicles in good condition need to be 10 dB quieter when used in ordinary traffic to give reasonable preconditions for the planning

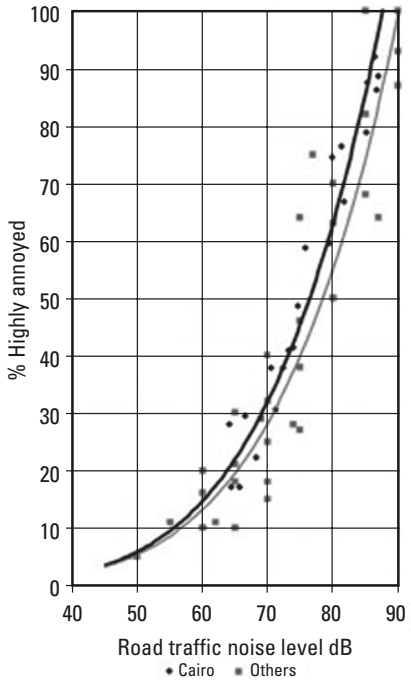


Figure 2. Results of a social survey in Cairo. The results are also compared to other results from the literature (Schultz and others) From reference 5.

Table 6. Road traffic noise levels in L_{dn} (dB) in 21 sites in Greater Cairo.[5]

Area	Road No. 1 L_{dn} (dB)	Road No. 2 L_{dn} (dB)	Road no 3 L_{dn} (dB)	Road No. 4 L_{dn} (dB)
Center of the city	-	85.3	75.8	70.6
Naser City	87	86.4	74.6	68.2
El-Ahram	86.8	81.4	72.4	66.6
Hulwan	85.2	79.5	71.2	65.7
Garden City	-	79.9	73.2	64.2
Old Cairo	-	81.8	73.9	64.5

and development of sustainable cities and well-being of citizens. During the past 3 decades, the emission levels for the individual vehicles have gone down by only 1-3 dB.[8] A special problem is the two-wheelers, which emit more noise than the cars for the same transportation work.

The lobby organizations on the emission side have to be counteracted by equally strong lobbying from the immission side to get relevant test methods and limit values for tires, road surfaces, and vehicles. Also, better traffic control systems are needed. A 10 dB reduction should then be achievable within some decades. It requires skilled engineering but does not require any fundamental technical breakthrough; it requires technology-forcing requirements. The fundamental prerequisite is a political leadership we have not seen in the past from those who act on national or international levels. And decisions on emission limits for ordinary vehicles can only be taken in broad international consensus.

Even so, the situation cannot be solved within a foreseeable future if good practice is not applied in town planning, traffic system planning, building design, and construction. It is important to have wide meshes for the main traffic routes. Public transportation systems need to be attractive and quiet. Strict noise emission requirements should consequently be set when cities buy new vehicles. Attractive routes for pedestrians and bicyclists with good traffic safety are further essential measures.

Further, it makes a great difference if the substantial variations in the noise levels we find in the built up city structure are exploited to the benefit of the citizens. In a Swedish research program,[9] it has been shown, that by exploiting these variations systematically and orienting bedrooms towards quiet sides of buildings much can be gained in terms of decreased annoyance and sleep disturbance. Good governance is needed to make effective use of town and building planning for better acoustic environments.

It is much easier and less expensive to get a reasonable acoustic environment with early, good planning than to improve a bad situation by measures afterwards. City structures are long-lived and they determine the noise situation in a wide sense for a very long time. This must be kept in mind not least for the rapidly growing megacities. Again, good and well informed governance is the key.

Acknowledgements

I am obliged to Prof. Paulo H. T. Zannin and Dr. Sayed Abas Ali for information.

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The 51st International Congress and Exposition on Noise Control Engineering will be held at the Scottish Event Campus (SEC) in Glasgow on 21–24 August 2022.

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Dr Yu Liu
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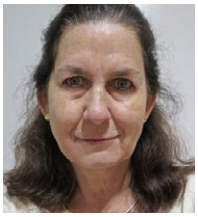
The Salford Group: Professor Andy Moorhouse, Dr Andy Elliott and Dr Josh Meggitt
Presentation title: Virtual Acoustic Prototypes – a story of four decades

Professor Bridget Shield MBE
Presentation Title: A Sound Environment for Schools
Sub Title: Sixty years of Research into the Impact of the Acoustic Design of Schools – A Review



Professor Maria Heckl
Presentation Title: Sustainable Combustion Technologies Need Acoustics Research

Professor Jin Yong Jeon
Presentation Title: Soundscape and Digital Therapeutics: Psycho-physiological Restoration

Find out more about Keynote Speakers

Main Topic Spotlights

Building Noise Control and Architectural Acoustics
The sessions under the main topic of 'Building Noise Control and Architectural Acoustics' at INTER-NOISE 2022 will give practitioners and researchers a great opportunity to get an International perspective on the latest developments in sound insulation, room acoustics and general aspects of building acoustics. It also provides ample opportunities for networking with other consultants and researchers.
Led by Professor Carl Hopkins

Community Noise and Planning
Effective planning is vital for the successful management of our soundscape and to minimise impacts on affected communities. The "Community Noise and Planning" topic will include papers on building for quality of life including use of the WHO Guidelines, the soundscape resulting from the pandemic and tranquillity. I will be attending Internoise 2022 to find out about the wide-ranging work that practitioners, researchers and policy developers are contributing too, both from the UK and our international counterparts from further afield. It is a unique opportunity to see how similar problems are addressed by those from other countries, right on our doorstep. I hope to see many of you there.
Led by Mrs Hilary Notley

Computer Simulation and Modelling
During the past few year research in Computer Simulation and Modelling has moved forward with wave based prediction now possible using Graphics Processing Units. Wave based predictions allow more realistic auralisations and focusing effects to be accurately modelled. I am looking forward to INTER-NOISE, the first major international conference since the ICA in September 2019, so 3 years! It will be great to see old friends, make new friends and network with fellow professionals. I can't wait!
Led by Professor Stephen Dance

Soundscapes & Acoustic Quality
The Main Topic on 'Soundscapes & Acoustic Quality' explores the scientific fundamentals and practical solutions on environmental sounds, as perceived, in context. Both outdoor and indoor soundscaping are considered. Sessions include Indoor soundscape, restorative soundscape measurement, analysis and design, industrial and rural soundscapes, soundscape and health, and AI in soundscape.
Led by Professor Jian Kang

Underwater, Ship & Offshore Acoustics
The 'INTER-NOISE 2022 Congress is covering quite a diverse set of topics in noise control, not only there will be presentation that deal with some of the more traditional topics, building acoustics, soundscapes, etc., but also to be covered are topics that relate to sound underwater and the control of sound as it is generated and propagated in the underwater environment. Underwater noise control is a very challenging topic and the papers to be presented at the INTER-NOISE 2022 Congress are not to be missed. This is a great opportunity to hear presentations about such challenging topic.
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- 130+ session topics related to noise control engineering.
- 40+ virtual Poster presentations

Sustainability

This congress theme, **'Noise control in a more sustainable future'**, is particularly timely and the congress venue is the same as that for the recent conference on climate change, COP 26. The sustainability of events is more important than ever and INTER-NOISE 2022 has a responsibility to reduce our carbon footprint. INTER-NOISE 2022 will be held at the Scottish Event Campus (SEC) which is prioritising better outcomes for their clients, the community and the environment through a sustainability strategy and their SEC Net Zero 2030 ambition. Working with staff, organisers of the INTER-NOISE 2022 Sustainability Working Group, partners and visitors all forms part of the overall engagement plan to support the net zero journey. Learn more about sustainability at INTER-NOISE 2022 here: https://internoise2022.org/sustainability/

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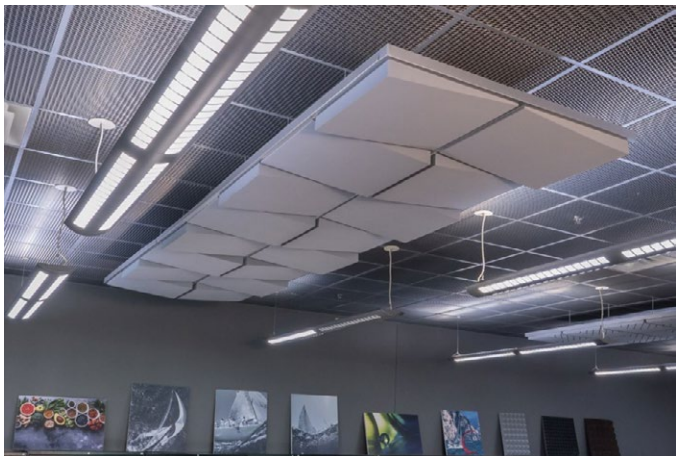
Product Spotlight: pinta acoustic introduces three new CONTOUR® Ceiling Tile patterns

MINNEAPOLIS — pinta acoustic's CONTOUR® Ceiling Tiles are now available in three new patterns, including Labyrinth, Taper and WHISPERWAVE™. They create modern effects while absorbing unwanted noise. Ideal for small- and large-scale indoor spaces, CONTOUR Ceiling Tiles are used in modern offices, lobbies, retail spaces, restaurants, entertainment facilities, worship centers and more.



"The three new CONTOUR patterns provide dynamic visual style with exceptional sound absorption," says Jean Sebastien Marineau, business unit manager at pinta acoustic, inc. "In addition to our standard CONTOUR patterns, we offer custom options, including company logos."

New Patterns:

Labyrinth

Taper

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For more information or to find a representative, visit www.pinta-acoustic.com or call 1.800.662.0032 or +1.612.355.4200. To download "The Science of Better Acoustics" white paper, go to https://bit.ly/acousticscience.

pinta acoustic, inc. manufactures a broad range of attractive direct-apply, glue-up ceiling and wall panels, suspended lay-in grid panels, suspended baffles and clouds for residential, commercial and industrial applications. pinta acoustic's product line includes WHISPERWAVE™, PHONSTOP™, CONTOUR®, HARMONI, WHITELINE®, SQUARELINE®, WILLTEC™ Flat Sheets, SONEX® Classic, SONEX Valueline, SONEX One, SONEX Mini, SONEX AFS, SONEX Linear Absorbers, SONEX Lumen Linear Absorbers, SONEX PLANO Absorbers, SONEX Rondo, SONEX Clean, PROSPEC® Barrier, Foam and Composite Materials, and acouSTIC™ adhesives.

The interaction between Noise and the UN Sustainable Development Goals.

Eoin A. King, Mechanical Engineering and Ryan Institute, NUI Galway, Ireland

**This is an edited version of a conference paper presented by the author at INTER-NOISE 2021, Washington D.C.*

The United Nations Sustainable Development Goals (SDGs) describe the major development challenges in the simultaneous pursuit of economic prosperity, environmental quality, and social equity. The SDG Framework comprises 17 broad goals, that cover a wide range of issues including poverty, hunger, health, education, gender equality, clean water, clean energy, sustainable cities and communities, climate, responsible consumption, and production, amongst others. Although noise and its management are not clearly identified in any of the 17 goals, this article posits that if noise is not adequately addressed, it will present a significant challenge to the realization of sustainable development.

Excessive noise has very well-established links to adverse economic, environmental and social impacts, and, in the pursuit of the SDGs, a failure to include noise as a consideration in sustainable development may jeopardize the likelihood of success. This aspect is even more important considering noise has earned the moniker of 'forgotten', or even 'ignored' pollutant. Noise must not be forgotten (or ignored) as the world strives for a more sustainable future. To demonstrate the

interactions between noise and the SDGs, this article divides the goals into 3 broad categories and draws on various studies to illustrate examples of the wide-ranging impact noise exposure may have, and how they might serve as a barrier to meeting the SDGs.

Noise and Economic focused SDGs

In the context of the SDGs, transport plays a central role in the drive towards sustainable growth. It is necessary to provide essential access to markets and supply chains. This is even more important in a global economy, where economic opportunities have been increasingly related to the mobility of people and freight, including information and communication technologies [1].

However, transport has significant negative externalities, including noise pollution. For example, at a global scale, shipping is the most widespread and persistent source of underwater noise. As the primary vehicle of global trade (~80% by volume), shipping, and its resulting noise pollution, is closely linked to global economic activity [2]. Transport, economic prosperity, the SDGs, and noise are all intrinsically linked.

Excessive noise exposure has real monetary impacts; reductions in house prices, lost labor days, reduced possibilities of land use, not to mention the significant cost of treating adverse health effects. In 2007, the social cost of road traffic noise in the EU22 was estimated to be at least €38 billion per year, approximately 0.4% of total GDP in the EU22 [3]. For rail noise, the cost was estimated to be a not insignificant €2.4 billion per year. These figures are based upon noise mapping results for the EU Noise Mapping Directive and only consider noise levels in excess of 55dB(A), hence are likely underestimates. Elsewhere, it has been estimated that a 5 dB(A) reduction in exposure levels across the U.S. would reduce the prevalence of hypertension by 1.4% and coronary heart disease by 1.8%, yielding an annual economic benefit of $3.9 billion [4]. While in the UK, Harding et al. (2013) estimated increased cases of hypertension-related acute myocardial infarctions, stroke and dementia per year, due to exposure to daytime noise, cost the UK economy £1.09 billion [5].

Noise and the Social focused SDGs

The commitment to eradicate poverty is an overarching objective of the SDG agenda [6]. Noise can adversely impact this commitment in a surprising number of ways. Take fisheries for

example; small scale fisheries play a critical role in supporting livelihoods and reducing poverty for millions of people living in coastal communities, with an estimated 56.6 million people around the world dependent on the fisheries and aquaculture sector as a full or part time source of income and livelihood [7]. Studies have shown that commercial fish catch rates drop substantially, with larger fish leaving an area coincident with noise events, and that increased bycatch rates and decreased fish abundance have been observed in the presence of noise [8].

Another example includes education. Education is the key to sustainable development, improving overall quality of life, and securing a successful future (SDG 4). Recent studies have found that acoustic comfort is essential in education, and is directly related to the implementation of emerging pedagogies [9]. Conversely, studies have found that tasks involving central processing and language comprehension, such as reading, attention span, problem solving and memory, appear to be most affected by exposure to noise [10].

Noise and the Environmental focused SDGs

Environmental noise has traditionally been dismissed as an inevitable fact of life and has not been targeted and controlled to the same extent as other health risks [10]. Mounting evidence linking noise to adverse health effects, coupled with proactive legislation, primarily in the EU, is now driving change. Clear links between excessive exposure to environmental noise and adverse health effects, such as annoyance, sleep disturbance, cardiovascular disorders and impaired cognitive development of children, have been established [11]. The World Health Organization estimates that at least 1 million healthy life years are lost every year from traffic-related noise in Western Europe [12].

Again, if we consider shipping, which is vital for global trade, attention must be drawn to its significant negative externalities that threaten sustain development. In comparing noise levels recorded in the 1960's to the early 2000's, *McDonald et al.* observed a 10-12 dB increase in ocean ambient pressure spectrum level in the 30-50 Hz band [13]. This was likely

attributed to both an increased number of vessels, but also increased average gross tonnage and horsepower per vessel. Mounting scientific evidence links noise exposure to a range of detrimental effects on marine mammals, sea turtles, fish, and invertebrates [14].

Conclusion

This article highlights the wide-ranging impacts noise exposure can have, and posits that the management and control of noise is an absolute necessity in the pursuit of the UN SDGs – noise control cannot be a forgotten aspect of a sustainable society. For further, more in-depth analysis, the readers is referred to a recent study provides a detailed account of how noise can be a barrier to each of the individual SGDs [15]. It is clear that the effects of noise need to be better integrated into concepts related to sustainable development, and commitments to meeting the SDGs must not be at the expense of the sonic environment.

The absence of noise as a consideration in the UN SDGs does not represent a significant departure from traditional thinking in this space. As reported in this issue of NNI, at the INTER-NOISE conference in 2005, Tor Kihlman's keynote talk highlighted noise as an important, but neglected, barrier to sustainable development. He identified a number of required developments that needed to occur to make cities sustainable, including, for example, that road vehicles need to be 10 dB quieter to give reasonable preconditions for the planning and development of sustainable cities. The noise control community knows what must be achieved for sustainable (acoustic) development, but there has been a disconnect between development and noise control. It is clear that a failure to address noise will present a significant challenge to the realization of the SDGs.

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Book Reviews

A Guide to U.S. Aircraft Regulatory Policy
Sanford Fidell, Vincent Mestre
Springer, (2020),
144 pp., hardbound, 109 USD, ISBN 9783030399078

This volume provides a concise chronological discussion of the history of US Aircraft noise regulations, up to and including the 1996 Revocation of the FAA Charter to promote civil aviation and the eventual FAA Act of 2018 and its potential influence on future aircraft noise regulations.

The book also provides a handy review on several closely related topics of interest. These include a review of the effects on individuals and communities of aircraft and airport noise (a topic for which Dr. Fidell is especially well known, and easily the most detailed chapter of the book). Other less rigorous chapters include aircraft noise measurement and modeling, airport land use planning and other airport noise mitigation strategies, and potential future changes to airport noise policy.

I did find the discussion of related topics to be useful and easy to follow for someone who is not a dedicated aviation noise specialist. However, I think that one additional topic that might have been useful to include would be a comparative analysis between US aviation policy and aviation noise policy around the world. For example, the European Union is known to be much more progressive in terms of noise control requirements for everything from consumer products to public projects. It would have been interesting to better understand how their aviation noise policies differ from those in the US.

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Acoustical Materials: Solving the Challenge of Vehicle Noise

Pranab Saha
Published by SAE International
ISBN 978-0-7680-8084-1 318 pages USD $70.00

First, I will report on the contents then provide my opinion of this brand-new book.

The eight-page table of contents lists the ten chapters:
1. Vehicle acoustics and understanding of noise, 30 pp.
2. Instrumentation and test facilities, 28 pp.
3. Hearing parameters, 14 pp.
4. Vehicle noise sources and solutions, 27 pp. 5. Sound absorber, 30 pp.
6. Sound barrier, 30 pp.
7. Vibration damper, 26 pp.
8. Case studies, 44 pp.
9. Test methods, 42 pp.
10. Closing the loop, 17 pp.

Each chapter, with about ten sections in each, is followed by a listing of numerous references and a section containing additional reading.

Following this is a forward by Jack Mowry, the famous Editor and Publisher of Sound and Vibration magazine, a two-page preface by the author, acknowledgements, "About the Author," and a listing of acronyms. After the chapters, there is a comprehensive index.

If you have no time to read this, my review in brief is this: an incredibly good book that needs to be on every acoustician's bookshelf.

Each chapter is fully detailed and informative. The chapters on sound barriers and absorbers are comprehensive and sufficient to provide more than just a basic understanding of the subjects. Also, the chapters on test methods are perfect for an introduction or even a review of the latest acoustical and vibration testing. The last chapter, "Closing the loop," tops off this excellent work while it discusses some of the fundamental concepts of acoustics, how to pick a test facility, and, of all things, how to design a reverb room.

That is enough of technical review. As a certified geezer, I have been reviewing books for years and this book is exceptionally excellent. The book is beautiful. Detailed, clear figures in color that are described fully in the text, wide margins (for note taking), and well-explained equations are just some characteristics that make this book the very best textbook I ever read or reviewed. This book is applicable not only for those in the transportation industry but also for anyone doing noise control. This book is highly recommended.

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Why You Hear What You Hear: An Experiential Approach to Sound, Music and Psychoacoustics

Eric J. Heller
Princeton University Press, Princeton, NJ, USA (2013), 590 pp., Hardbound, 120 USD, ISBN 978-0-691-14859-5

There are numerous proofs of the Pythagorean theorem. Euclid provides one of the more interesting in his Elements where he uses only the geometry axioms he originally proposed. No algebra or trigonometry is needed, and the proof is remarkable because he gets there with a limited set of tools.

I appreciate Eric Heller's *Why You Hear What You Hear: An Experiential Approach to Sound, Music and Psychoacoustics* in much the same way. Heller goes about introducing the science of acoustics with a substantial handicap. Namely, calculus

and differential equations are not welcome. Yet, Heller's accomplishment is more impressive because he teaches with a set of limited mathematical tools. Heller compensates by using intuition and pulling in similar phenomenon from fields outside acoustics where appropriate.

For instance, he explains impedance by aligning coins on a table. He gives the reader a conceptual understanding of autocorrelation by looking at temperature variations in Fairbanks. He describes vibrational modes using beads on a string. Along the way, Heller adds color to the discussions by mixing in historical anecdotes and quotes from well-known personages like Aristotle and Galileo. Even Napoleon plays a role in the history of acoustics. He recounts how the sound of bells was apparently heard by a ship 100 miles away at sea. That would seem to be impossible, but he goes on to show how it just might be plausible. In an amusing aside, he recounts how Sabine's frequency in getting haircuts affected the reverberation time in his room and that one of his students surmised that hair might be a very good sound absorber.

I found the book as entertaining as it is informative. It is lucidly written, and the explanations and rudimentary mathematics can be understood by first year undergraduates. The text is inviting because the volume is nicely illustrated and attractively laid out. Where illustrations are not enough, Heller relies on Paul Falstad's physics applets that are freely available online. I was not aware of these applets prior to reading the book.

The book proceeds in a logical fashion by first discussing sound and wave propagation. It goes on to discuss some signal processing basics such as the Fourier transform and autocorrelation. Heller then describes sources of sound, vibrational modes, damping, and the impulse response. Musical acoustics is next with chapters on wind instruments, the voice, violin, and piano. The book then moves on to discussing psychoacoustics where concepts like loudness, pitch perception, and timbre are explained. The book concludes with discussions on architectural acoustics and outdoor sound propagation.

The text can be used for a myriad of introductory level undergraduate courses in acoustics. However, I suspect that more experienced acousticians and noise control engineers will derive greater pleasure from it. There are surprises in every chapter. This is a book that makes acoustics interesting. Simply put, this is a fantastic book and is highly recommended.

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Worship Sound Spaces: Architecture, Acoustics and Anthropology

Edited by Christine Guillebaud and Catherine Lavandier
Routledge, New York, NY, (2020),
256 pp., Hardbound, 140 USD, ISBN 9780367234225

Worship Sound Spaces is a collection of 11 papers based on work conducted at a 2015 Conference of the same title. The papers are organized into three sections: (1) Sonic architecture: acoustic intentions in worship buildings, (2) Experiencing the sacred through sound, and (3) Restoring the sound ambiances of the past. An introduction by the editors and an afterword by Jean-Paul Thibaud are also included.

Since this book is a collection of papers, the reviewer tried to summarize some general thoughts and impressions for each section rather than summarizing each of the papers. The titles do a good job of describing the general topic of each paper, but there is too much information to simply summarize them in a few sentences.

Introduction: Religious listenings: a multidisciplinary approach, by Christine Guillebaud and Catherine Lavandier
Part 1: Sonic architecture: acoustic intentions in worship buildings

Paper 1: Characterizing the acoustics of places of worship: should we believe in acoustic indicators? by Marc Asselineau
Paper 2: Towards a history of architectural acoustics using archaeological evidence: recent research contributions to understanding the use of acoustic pots in the quest for sound quality in 11th to 17th century churches in France, by Jean-Christophe Valière and Bénédicte Palazzo-Bertholon
Paper 3: Temple soundspaces and ancient Hindu ritual texts, by Gérard Colas. This paper provides a brief overview of the soundspaces within the Hindu temple.

The three papers in this section examine three different worship spaces from a room/environmental acoustics perspective. Key items include the metrics used to define spaces, what do we believe was the intention of acoustic pots placed in a liturgical space, what are their measured effects on the acoustics in the space, and purpose and function of sound in Hindu Temples. In paper 3, I found it interesting as a noise control engineer that "temples are assessed according to the distance at which the sound of the conch is perceived" as well as other information presented.

Part II: Experiencing the sacred through sound

Paper 4: The worldmaking ways of church bells: three stories about the Cathedral Notre-Dame de Paris, by Gaspard Salatko
Paper 5: What should the reverberation inside a masjid be? A study exploring the demands of Imams, by Ahmed Elkhateeb (defining reverberation times for the performer (Imam) as well as the worshipers; chant not sung — presence of prayer rugs)
Paper 6: Soundwalks in a Shiva temple: a situated approach to perceived ambiance, by Christine Guillebaud (within and around the temple sound acts as a ritual action, timing, etc.)
Paper 7: Bells, auspiciousness and the god of music: reflections on sound in ritual spaces in Nepalese Hindu traditions
Paper 8: Resonant voices and spatial politics: an acoustemolog of citizenship in a Muslim neighbourhood of the Kenyan coast, by Andrew Eisenberg

Having only studied and worked with catholic congregations in the US, I found these papers enlightening. Instead of working on separating the sound inside and outside of a worship space, in other cultures and traditions, there is distinct interaction. This can be highlighted with the sound around and within a Shiva temple, a highly complex acoustical space. Bells are not simply tools to call congregants to worship but can be ritually personified. The preferred reverberation time inside a

masjid is much longer that I would have expected based on my experiences with various vocal performance spaces.

Part III: Restoring the sound ambiances of the past
Paper 9: The church beyond worship: experiencing monumental soundspaces in the Roman Catholic churches of Montréal (Québec, Canada), by Josée Laplace
Paper 10: Sound heterotopia in Cistercian monastery, by Pascal Joanne
Paper 11: The original acoustics of the 17th-century Mughal heritage of Burhanpur, India, by Amit J. Wahurwagh, Akshay P. Patil and Alpana R. Dongre
Afterword: A world of attunements, by Jean-Paul Thibaud

The acoustic experience for worshipers in a space extends beyond listening to spoken or musical messages. Perhaps this is perceived by many people during the ongoing pandemic where typical worship may not be possible. Within the worship space, we interpret and react to the acoustics of the space on different levels with the added dimensions of quiet and reverberation creating an otherworldly image. Otherworldliness can be extended to the concept of heterotopia, from philosopher Michel Foucault. Using Cistercian abbeys, two case studies are presented. Maintaining the original aesthetics of a space during restoration includes restoring acoustics of the space. This can be a challenge with older spaces having undergone partial restoration. Simulation using period material properties and original geometry makes this possible.

I originally expected more of a textbook covering the acoustical design of various worship spaces. While the text does provide much information on types of worship spaces both common and not common in the United States, it also provides more. I do find myself thinking about sound in my environment, both during leisure and work, and how the role sound plays during these experiences. Hopefully, this review will intrigue some of you, who may have not considered purchase of this text, or who have not read much about soundscapes to give it a read or attend a soundscape sessions or two at an upcoming conference.

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NOISE/NOTES

Eoin A. King, NNI Editor

NNI is on Facebook and Twitter - we try to keep our readers informed with noise news from all across the globe by highlighting interesting research and projects. Here is a roundup of some of the stories that have been making headlines. Follow @NNIEditor to stay up to date with all noise related news.

Traffic noise slows children's memory development

The Guardian (UK) recently reported on a study conducted in Spain that found that exposure to road traffic noise can significantly slow the development of crucial memory and attention skills in your children. The study of almost 2,700 children aged between 7 and 10 in Barcelona, is the first to assess the impact of traffic noise on child cognitive development over time and to determine the impact of peaks in noise. The research revealed that peaks of noise heard inside the classroom, such as the passing of loud trucks or vehicles accelerating away from traffic lights, had more impact than a higher average level of noise.

Noise at the Great Barrier Reef

Researchers from the universities of Exeter and Bristol, recently evaluated the effect of noise and the breeding of fish (called Spiny chromis) around the Great Barrier Reef in Australia. The research team introduced traffic calming measures involving speed restrictions and reduced traffic within 100m of three reefs near Lizard Island on Australia's Great Barrier Reef. They then tracked the breeding of fish and compared the results with breeding on three other reefs with busy boat traffic, and found that 65% of nests on quieter reefs still contained offspring at the end of the season, compared with 40% on reefs with more traffic.

Barcelona developed noise monitoring network across city

Returning to the Guardian (UK), it reports that the city of Barcelona is developing a network of noise monitors across the city. This is motivated by a recent study by Barcelona's public health agency which found that about 57% of people in the city are regularly exposed to noise levels that exceed those recommended by the WHO. Sound meters are expected to be installed in all the areas where residents regularly complain of noise.

INCE-USA is on YouTube!

INCE-USA recently launched its own YouTube channel. At the moment the channel has a number of tutorials related to taking measurements with sound level meters, including "Choosing a Sound Level Meter", "Practical Tips on Sound Level Meter Use", "Conducting a Noise Survey with a Sound Level Meter", and more. Theses videos come from a special tutorial session on taking sound measurements with sound level meters, that was held during NOISE-CON 2020.

NCEJ
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Looking for Aeroacoustics reviewers!

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The Noise Control Engineering Journal (NCEJ) is looking for high quality reviewers in the subject area of aeroacoustics. NCEJ receives numerous papers related to flow noise and control methods to manage aerodynamics noise sources and propagation, and needs reviewers to help evaluate submissions in this important area. If you would like to serve as a reviewer, please contact the NCEJ editor at EditorNCEJ@inceusa.org

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