



Mark and Focus

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Mark and Focus

In the 21st Century, the world faces a wide array of mega-trends including climate change and rapid population and economic growth. With resources becoming scarce global economic and social stability is threatened. Mark and Focus covers both the risks and opportunities these mega-trends provide to business, governance, and society.

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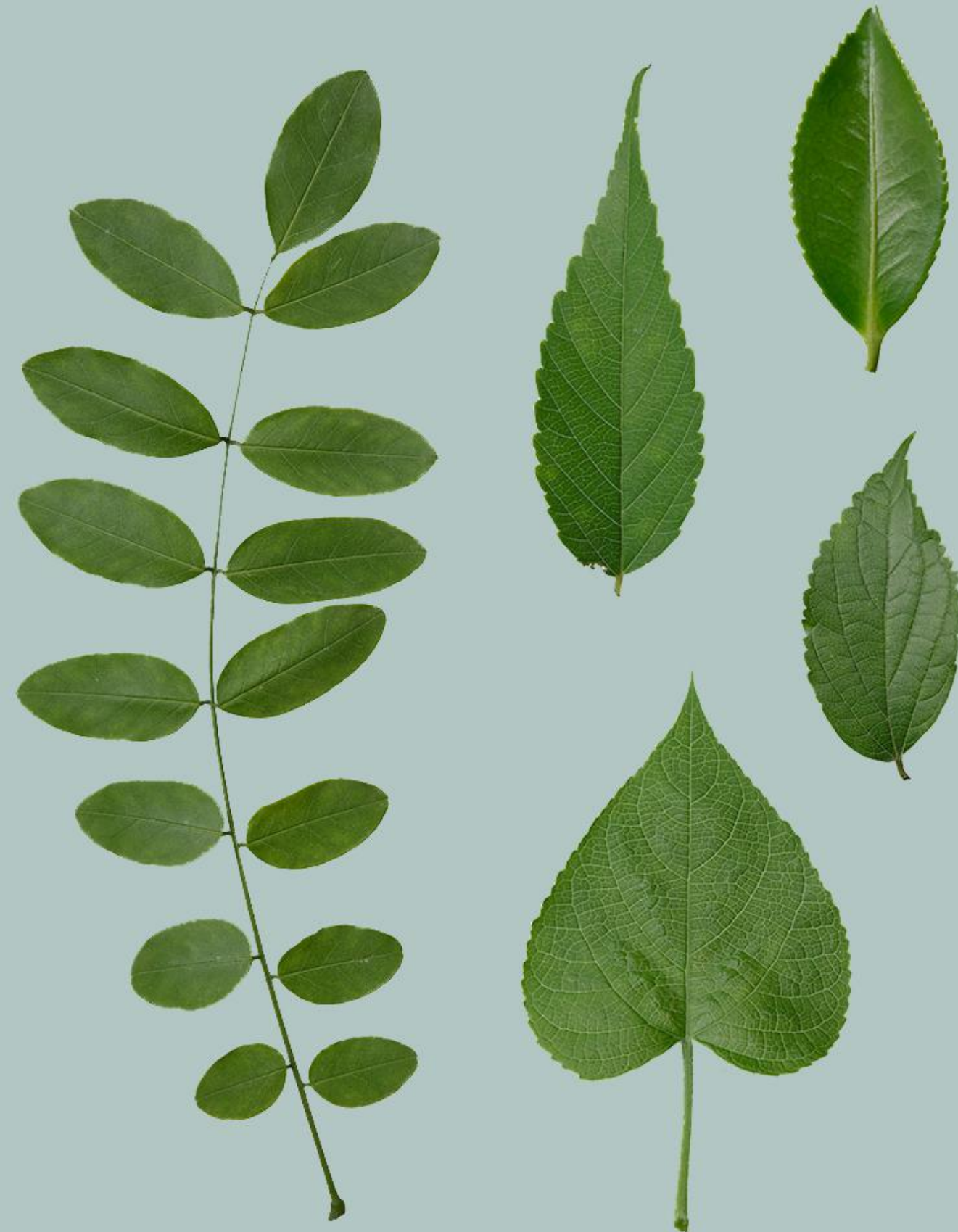
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Urban Planning for Healthy Cities: A practical approach

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This article presents the concept and science behind a "healthy city" and introduces a proven approach to deliver them through the Healthy Cities Generator.

Cities determine the health of their populations; they can either be a catalyst for better health or detrimental to the health of their citizens. We have built urban environments to be functional, to provide services and to offer employment and opportunities. In many cases cities have followed specific urban planning approaches and strategies, but not all proved to be effective, especially when it comes to health. Contemporary, urban environments may cause stress and anxiety, even unintentionally promoting obesity and heavily polluting the environment. Air quality, noise levels, quality and access to green and blue spaces, lifestyle and temperature are all key determinants of health and cities must find ways to address those issues.



The concept of healthy cities is more relevant now than ever - we live at a time when mental and environmental health have captured the public's attention and are in the spotlight. Now is the time to make better decisions not only for ourselves but for future generations. Cities have the potential to be hubs of opportunity and promoters of healthier lifestyles. They can be a focal point for positive change by encouraging people to exercise, allowing them to connect more easily with their communities and nature, and becoming a place where biodiversity can thrive.

What is a healthy city?

A city that is actively involved in developing programmes, processes, and policies to improve health - physical, mental and environmental health - is a Healthy City. A healthy city considers health as an important pillar of all actions, adopting an integrated planning approach and taking a proactive attitude towards health and wellbeing, rather than simply reacting to poor health with the treatment of illness.

As defined by WHO “a healthy city is one that continually creates and improves its physical and social environments and expands the community resources that enable people to mutually support each other in performing all the functions of life and developing to their maximum potential”.

There is not one way to achieve a healthy status nor a one-size-fits-all solution, but a commitment to always improve and be conscious of the determinants of urban health makes a city healthier.

The science behind the concept of a healthy city

The scientific evidence is clear: air quality, noise, lack of green spaces, heat, and lack of physical activity all have an impact on cardiovascular, respiratory, muscular, psychological and reproductive diseases, as evidenced in many scientific soundbites:

Walking briskly for 30 minutes a day reduces the risk of heart attack by 20-30%, diabetes by up to 40%, and depression by 30%. Urban planning has a duty to provide the right environment - with green spaces and walking routes - to facilitate this daily physical activity in a comfortable, accessible, and safe way.

Green spaces have major impacts at many levels. Research shows that having a green space less than 500m from home increases physical activity by three times, which is especially relevant considering that 53% of the European population is overweight. Further research on health in cities estimates that air pollution causes 800,000 premature deaths in Europe each year, and that more than 80% of the urban population breathes air with PM2.5 particulate matter levels above the WHO recommended levels.

If WHO recommendations on physical activity, air quality, noise, heat and access to green spaces were met, many lives could be saved. In Barcelona, an estimated 20% of premature deaths could be prevented each year, saving €9.300 million annually.

The evidence is so vast and so clear that forgetting health when planning our urban environments is no longer an acceptable option. It is no longer a matter of faith or will, but a simple and obvious necessity.

Three key aspects for making healthy cities

1. A holistic urban planning approach that places health in all projects and policies

To work toward a healthier city, urban planning and policies are key. A truly healthy city sees urban planning as an opportunity to boost citizens' health and wellbeing. Scientific studies indicate that urban planning can affect many urban determinants (green and blue areas, walkability, traffic) with a direct impact on health indicators (cardiovascular diseases, physical activity, depression). The influence of urban determinants on health can be direct (on some indicators such as cardiovascular diseases, respiratory diseases, diabetes, depression, etc.) or indirect (on some health determinants such as physical



activity, food habits, air quality or noise pollution). Despite the ample evidence it is not always easy to connect this knowledge to the specific policies enacted by the city.

To prioritise people's health in urban planning means to re-think all policies and strategies through a focus on the effect they will have on the health of citizens. Moreover, it is about

incorporating a vision of health that is built from a comprehensive and transversal point of view: physical health, mental health, and environmental health.

Health in all policies (HiAP) is a holistic approach to improve the health status of cities that goes beyond policies. In fact, health in all practices is even more appropriate. HiAP considers health

implications systematically across sectors, ensuring governments commit to improving health and well-being. This approach makes health a central pillar across different agencies and sectors, supporting collaboration with its evidence-based method. Adopting the HiAP principle can help accelerate the cities of the future in which urban planning is a generator of health.

2. Training and collaboration of practitioners - make everybody health promoters!

Decision-makers must understand that a truly healthy city works with and for all stakeholders – every city department, the private sector, and most importantly of all, the citizens. To realise this ambitious goal, awareness and education among all stakeholders is essential. Urban planners can be instrumental to these discussions by creating a space for dialogue on how to design cities for better social interaction, more physical activity, and higher quality green spaces. With this approach, the physical space can become one of the best promoters for healthy living in cities. Health experts should also be part of the conversation and engage more on preventive healthcare services.

3. Be proactive, mitigate the negative impacts, and plan for more and better health

To take a proactive approach to health, city planners and policy makers should use Health Impact Assessments (HIAs) to better understand the impact of various urban factors on

health. However, HIAs are often seen as an inessential add-on activity, rather than as a key preventative measure for improving overall health. Furthermore, the lack of involvement with health experts in current HIA implementation hinders the effectiveness of their results.

Unfortunately, HIA is not a common practice in urban planning. Though it may add a layer of complexity to the planning process, it is an invaluable and adaptable tool that can adjust to fit the needs and expertise of its users. As a practice, HIAs aim to produce a set of evidence-based recommendations that maximise positive health impacts and minimise negative ones. These are used to inform decision-makers and the public when policies or plans with significant potential to impact health are being considered. HIA is best implemented when its users also support the HiAP approach.



Benefits of nature-based solutions

- Carbon sequestration
- Flood risk mitigation
- Health and well-being
- Ecological connectivity



Our Future Water

Our approach: a healthy cities' generator

To connect the dots between health and urban planning, professionals need tools to help them visualise the impact of their plans and see how small adjustments could make a big difference to the lives of local people. Tools that can build upon the traditional HIA and create further space for knowledge sharing. The **Healthy Cities Generator** (HCG) is a hands-on, practical planning tool designed to give actionable indicators for anyone looking to integrate health into planning. The HCG aims to bridge the gap between 'what we know' and 'what we do' by making it easy for urban planners and policy makers to incorporate health factors into urban planning and urban factors into health policy.

Based on a systematic review of scientific peer-reviewed publications linking urban determinants and their impact on health, the HCG automatically calculates the health impact of urban planning actions. Combining these science driven insights with a lean, easy to use interactive interface, the tool

provides unique support to decision makers, planners, and health professionals.

This cutting-edge resource is led by a team originating from the **Healthy Cities Network** - Marta Rofin Serra, award-winning architect from the **City of Vic**; Dr. Sebastiaan van Herk, Director of Environment at **Bax & Company**; Amber de la Haye, Consultant at **Bax & Company** and Sofia Aivalioti, Consultant at **Bax & Company**.

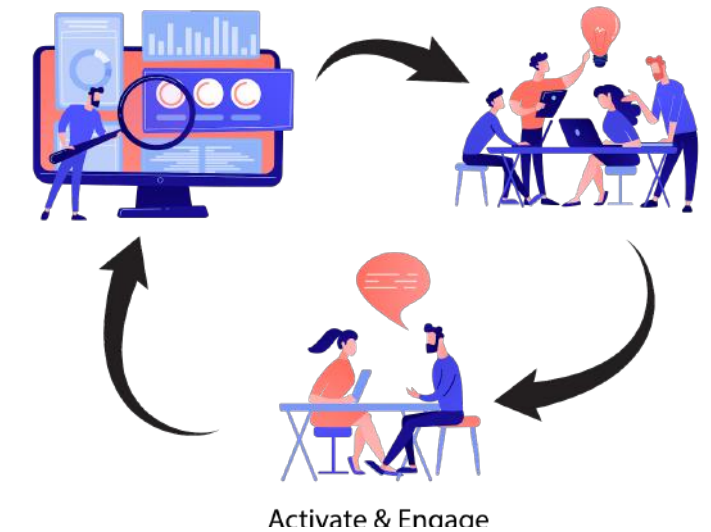


Figure: Healthy Cities Generator Concept

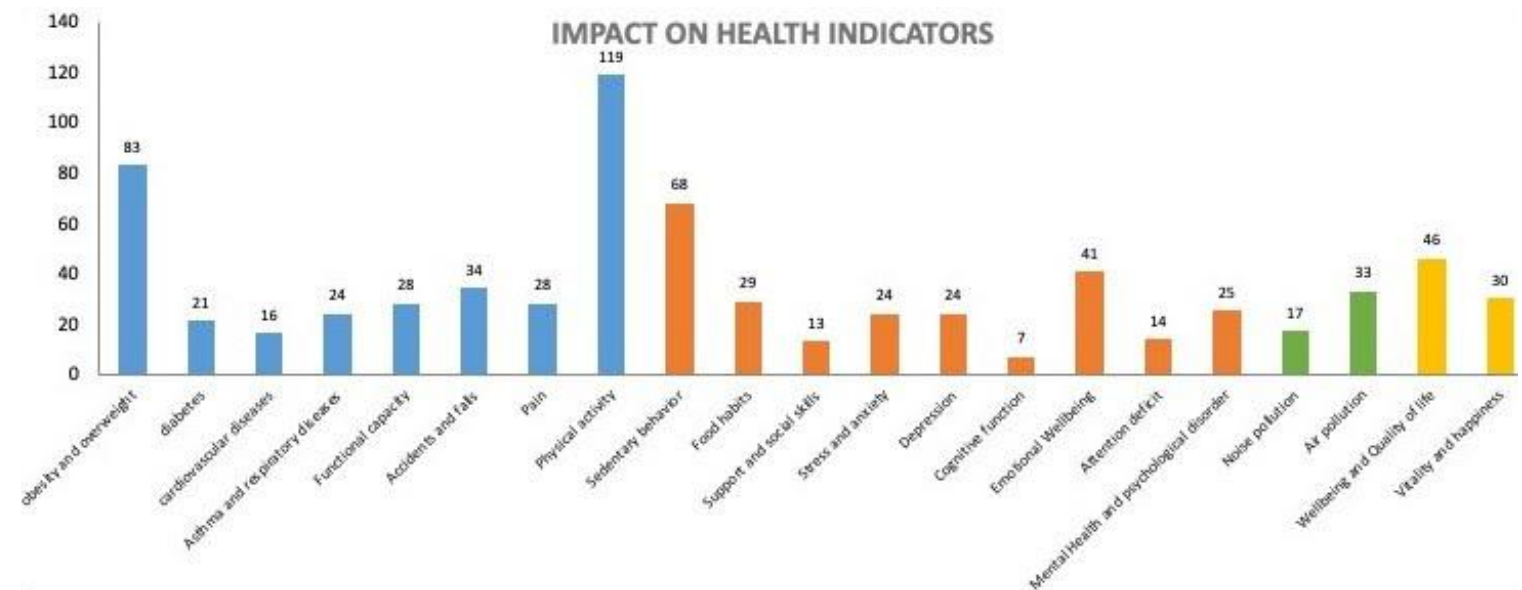


Figure: Results of using the Healthy Cities Generator to assess the health impact of an urban plan a new updated version of the tool to be released.

REGIONAL WATER SECURITY



ROBERT C. BREARS

WILEY Blackwell

Regional Water Security

Robert C. Brears

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Regional Water Security provides new research on policy innovations that promote the application of demand management and green infrastructure (GI) in managing water resources across regions sustainably. In particular, with regional water security around the world at risk from climatic and non-climatic challenges impacting water quantity and water quality, this book, in addition to providing examples of demand management and GI being implemented in various locations globally, contains in-depth case studies that illustrate how regions, of differing climates, lifestyles, and income levels, have implemented policy innovations that promote the application of demand management and GI to achieve regional water security for humans while protecting and restoring the natural environment.

Regional Water Security will be of interest to regional water resource managers, town and regional planners, resource conservation managers, policymakers, international companies, and organizations as well as environmental NGOs, researchers, and graduate and undergraduate students.

REGIONAL WATER SECURITY



ROBERT C. BREARS

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ABOUT THE AUTHOR

Robert C. Brears is the founder of Our Future Water, Mark and Focus, and Mitidaption. He has published widely on water security, water resources management, and related issues, and has conducted field research worldwide, including Antarctica.

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GIS in Smart Cities: More than just pinning

Antonio Natale, GIS expert and project manager at WiseTown (a FIWARE Foundation gold member)

Antonio Natale, GIS expert and project manager at WiseTown (a FIWARE Foundation gold member), explains why geospatial information technology is ripe for adoption in smart cities, and demonstrates the benefits it can bring.

Today, digital maps are changing the way we understand and interact with data. Overlaying data on geospatial maps can highlight correlations that are far from intuitive, and yet, geospatial data representation for smart cities today is often limited to simply pinning data acquired by sensors on a city map, when it could be so much more.

While maps showing the sensor location with pins may illustrate the effort a city has made to build its sensor infrastructure, simply displaying a pop-up data window by clicking on the pin does not create new knowledge.



An early example of knowledge creation via geospatial visualisation dates back to 1854. Doctor John Snow was investigating the insurgence of cholera cases in London when he produced a map.

The simple act of putting bars on a map clearly demonstrated that the highest concentration of deaths were in direct proximity and barycentric to the location of the water supply pump, represented on the map. It was previously believed cholera was transmitted by "miasma" in the air.

Studying the correlation of two pieces of information on the map (pump position and cholera outbreaks), Dr Snow was able, for the first time, to speculate that the transmission was due to water and its contamination.

GIS (geospatial information systems) would have substantially accelerated Dr Snow's discovery had he had access to them in the 1850s. With a GIS tool called heatmap, for instance, a far smoother and evident reading of the incidence rate would have been visible – with a deep red concentration near the pump gradually fading and expanding to 'cooler' blue tones with further distances from the pump.

Many more GIS analytical tools were produced decades ago but are not yet widely used. Although not overly complicated in their theoretical principles, and therefore accessible to non-scientists, they can be incredibly impactful for decision-making within city administrations, regarding, for instance, new services and infrastructures, city mobility dynamics, urban greenery, and vandalism.

Especially during the recent pandemic, the importance of analysing data related to its spatial dimension has become evident to many public administrations. Amongst these tools, the following are worthy of mention – all of which would have been useful for Dr Snow:

1. *Mean centre*: Identifying the geographical center of deaths distribution
2. *Standard distance*: Generating a circle around the geographical centre with a radius proportional to the concentration or dispersion of deaths distribution
3. *Thiessen polygons*: Starting from the distribution of water pumps – any point within the polygon is closer to the associated pump than to any other
4. *Kernel density*: To smooth the death points cloud into a smooth surface, in order to calculate a sort of "magnitude-per-unit area"
5. *Spider diagram*: To present the spatial distribution by combining the points of the water pumps with the location of deaths.

An interesting more recent example of urban spatial analysis was applied to childcare (0-5 years) in the Italian city of Turin, with the Torino BeBi initiative. An app showed the proximity analysis of childcare facilities in a certain area, enabling the better-informed planning of new ones and creation of better infancy policies by the municipality.

Another project using geospatial analysis was the WELCOME project in Perugia, also in Italy, at the Eurochocolate International Festival. During the event, which takes place on the main streets and squares of the city's historic centre, the city becomes a destination for many visitors from the surrounding areas, but also from outside the region.

Through a tool known as Hot Spot Analysis (Getis-Ord Gi*), it was possible to:

- Investigate the flow of people within the city of Perugia (eg shuttles, minimetro, buses, cars, parking)



- Analyse the flows of the main access routes to the city (expressway and railway)
- Study the intersection dynamics between different flows within the city of Perugia when the Eurochocolate flows collided with other city activities (eg amusement parks, local markets, sports events).

Some GIS analytical tools can also be used to exploit data collected from IoT sensors, like those managed through an IoT platform like FIWARE. FIWARE has been pivotal in easing data acquisition and platform customisation, allowing the use of the new IoT technology in many domains, including smart cities.

Technologies such as the **FIWARE Context Broker** are a hub for facilitating the analysis of data and phenomena. This is a great opportunity for cities to start from robust foundations and focus on developing an understanding of their city. FIWARE also allows less affluent, non-megalopolis areas to equip themselves with the necessary platforms.

The challenge now is how to utilise the sensor data to look beyond just the figures and infer their meaning to provide meaningful decision-making support to public administrators. Adding pins to a map will not be enough, however, spatial analysis and spatial statistics skills cannot be improvised.

The question is, are cities ready? Are they equipped with the right internal processes to start thinking geospatially? FIWARE can play a crucial role in this respect, facilitating the emergence of independent initiatives, utilising APIs and ready-to-ship building blocks to develop applications for accurate data analysis.

The ingredients are all there to take the next step in smart cities – this cannot fail to also pass through better geography and spatial analysis.





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WATER RESOURCES MANAGEMENT

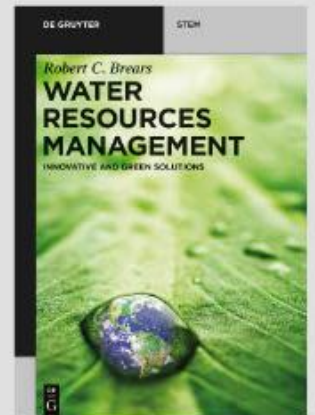
INNOVATIVE AND GREEN SOLUTIONS



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Edited by Robert C. Brears

WATER RESOURCES MANAGEMENT INNOVATIVE AND GREEN SOLUTIONS



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- Gives a perspective on the challenges for the future.
- Written by a well-known expert in the field of water management.

Water resources management consists of planning, developing, distributing, and managing available water resources. With increasing climatic and non-climatic challenges, optimised water management becomes more demanding. This book presents innovative solutions to these challenges in the areas of water conservation, recycling, and reuse, recovery of resources from wastewater, protection of water quality, and smart water management. It also presents innovative financial solutions to meet water challenges globally.

Robert C. Brears, Our Future Water, Christchurch, New Zealand.

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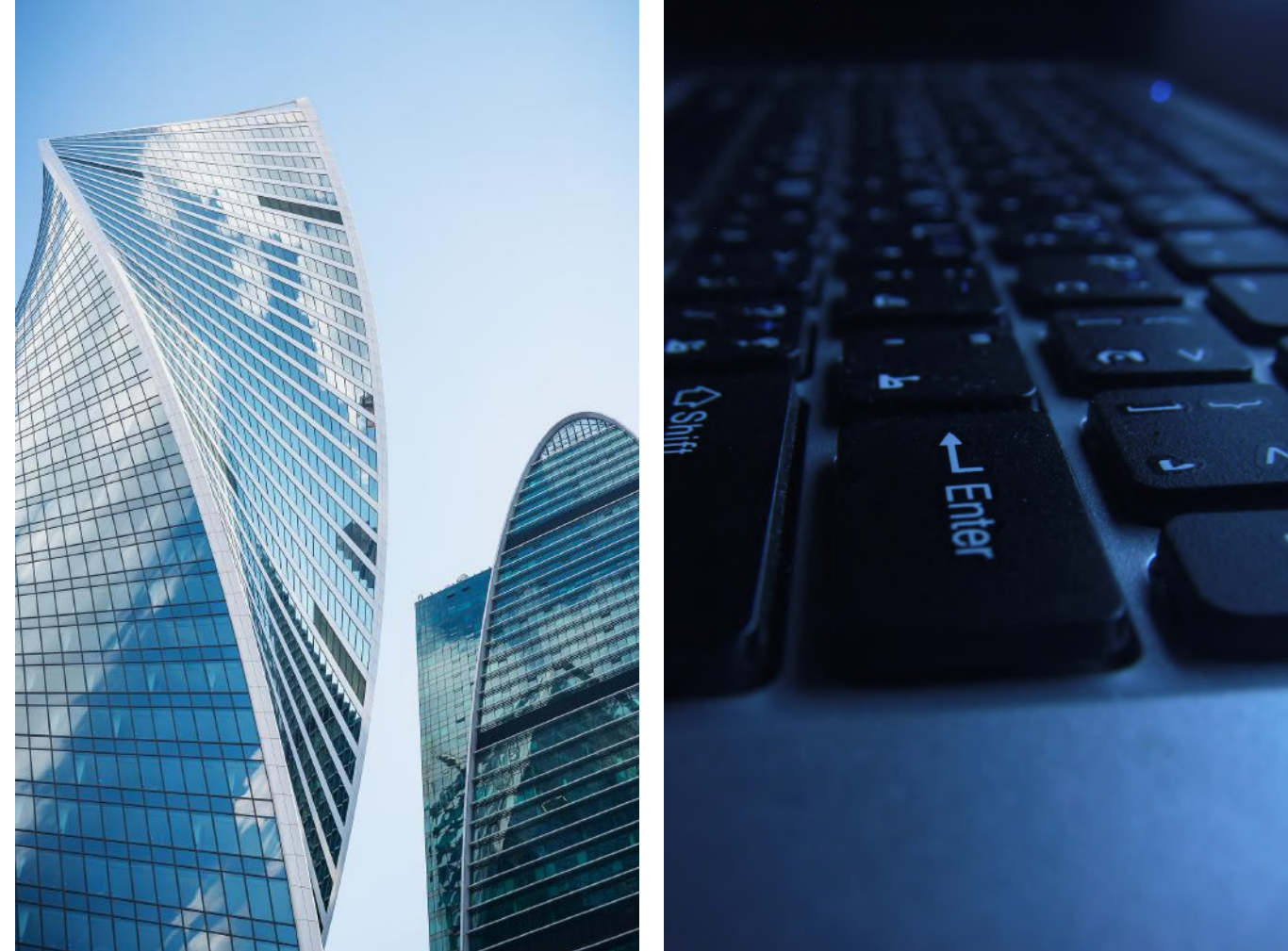
Smart Platforms Helping Build a Sustainable World

Jose Benitez, CEO, Secmotic; Carlos Corrales, COO, Secmotic; Luis Romero, Managing Partner, Emergya Grupo; and M. Giménez-Medina, Product Manager, FIWOO

Smart platforms, with their respective connected technologies, are stepping in to solve typical problems faced by cities.

To turn our world into a more sustainable place, it is necessary to think differently, using technology as a lever. For cities, transforming themselves into smart cities is a good starting point. Smart cities are characterised by the use of new technologies to improve the lives of their citizens and visitors.

They aim to solve typical problems such as mobility, accessibility, inclusion, energy consumption and environmental threats. Creating solutions that are smart, safer and sustainable, while also taking into account specific demands and individual requirements, should be a top priority for cities' representatives across the spectrum.



Moreover, the concept of smart cities strives to highlight how the integration of existing technologies can provide users with further choices, create new services and support jobs and growth within the data economy. And to achieve this, the most holistic way is through smart platforms.

The role of smart platforms

Smart platforms provide information management of the multiple systems of a city. Alongside big data, virtual reality and artificial intelligence, the Internet of Things (IoT) is the technology most linked to smart platforms.

IoT platforms are the most promising to provide unification and context to the enormous variety of data generated by smart cities and turn that data into actionable and contextualised information. Such information can, in turn, be used to reduce energy consumption and operating costs while improving the safety and quality of life of citizens.

Smart city platforms such as [FIWOO](#), based on [FIWARE technology](#) and open standards, offer a complete product at both intuitive software and hardware levels. Focused on the user, it offers a global and integrated vision of the city in question.

In any given city, there are different areas to be regulated. FIWOO offers its platform to any city worldwide to manage areas such as:

- *Smart mobility*: Improve the efficiency of all means of transportation
- *Smart environment*: Optimise natural resources and protect the environment
- *Smart economy*: Boost the innovation and development of the city
- *Smart government*: Offer more efficient digital systems for citizens
- *Smart living*: Produce smart homes to improve home care
- *Smart people*: Use citizens' participation as an intelligent sensor

Managing the environment in a smart city

For a smart environment, action falls on trying to mitigate effects that damage the natural space, such as climate change. To avoid major consequences for the environment, many cities have presented the ambitious goal of achieving zero CO2 emissions, such as Copenhagen (by 2025) and London (by 2050), via proper water management, energy, waste and air quality systems.

Proper water management is a controlled consumption that avoids large losses. To that end, devices capable of measuring and monitoring multiple parameters and variables of interest to the user are used. These devices work wirelessly through IoT networks and allow readings of water consumption and quality control. With regards to irrigation in parks and gardens in the city, an online management system can be put in place via the use of satellite images that identify the type of vegetation and its state.

Energy management and air quality

Promoting the use of renewable energy, such as solar or wind energy, should be a priority for governments committed to reducing the carbon footprint left by conventional energy usage. To put it into practice, solar panels can be used in public spaces and government buildings, as is already the case in Singapore and Copenhagen. Making LED lights available throughout a city's street lighting can reduce annual consumption by 60 per cent. With the same objective, intelligent lights – which

are sensitive to the presence of people on the road – can be used through sensors to avoid unnecessary energy costs.

Selective waste collection must be a reality throughout the city. In this system, all streets have smart and colourful containers for recycling. These containers have a system capable of detecting – through sensors connected

to a central post by IoT networks – when they are full, overturned or damaged. Vehicles are the main precursors of poor air quality in a city.

The main problems generated by traffic are air and noise pollution. In many cases, the mass of cars on the streets is inevitable. However, in many others, the problem can be overcome through the use of smart sensors that help prioritise



public transport and control current traffic at each point of the city, as well as applications that show the availability of parking spaces through wireless counting sensors in each of the squares. In addition, there are emission monitoring systems from vehicles and machinery that connect with the devices to know and reduce the emissions of gases emitted by those.

A sustainability strategy for cities

Powered by FIWARE, FIWOO is an adaptable and functional platform that can be used in various areas of an industry or city. Despite its versatility, the main markets in which it operates today are smart industries, smart cities, smart buildings and smart ports.

With regards to smart cities specifically, FIWOO offers functionalities that allow city administrators to measure the level of pollution, the energy efficiency of buildings and the air quality and to establish smarter lighting initiatives in cities, reducing total energy consumption.



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SOLUTIONS**
= WATER SECURITY



Our Future Water

NATURE-BASED SOLUTIONS TO 21ST CENTURY CHALLENGES

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Nature-Based Solutions to 21st Century Challenges

Robert C. Brears

This book provides a systematic review of nature-based solutions and their potential to address current environmental challenges. This book systematically reviews nature-based solutions from a public policy angle, assessing policy developments which encourage the implementation of nature-based solutions to address societal challenges while simultaneously providing human well-being and biodiversity benefits. It will be of great interest to policymakers, practitioners and researchers involved in nature-based solutions, sustainable urban planning, environmental management and sustainable development generally.

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Achieving Water Security

Robert C. Brears, Founder of Our Future Water

How can demand management and nature-based solutions help achieve water security for all, while helping protect and restore the natural environment?

Achieving water security is critical to ensuring access to safe and sufficient drinking water for all to safeguard human health and well-being; protecting livelihoods, human rights, and cultural and recreational values; and preserving and protect ecosystems and sustain their critical services.

However, climate change and associated extreme weather events are impacting water security by reducing the availability of water and posing threats to drinking water quality. In the face of interacting factors such as increased temperature, increased sediment, nutrient, and pollutant loadings from heavy rainfall, increased sediment, nutrient, and pollutant loadings from heavy



rainfall, increased concentrations of pollutants during droughts, and disruption of water and wastewater treatment facilities during floods, conventional treatment processes simply won't suffice.

The stakes could not be higher. Climatic extremes that affect water quantity and quality expose individuals, communities and countries to numerous socio-economic risks. They notably threaten the global economy. Floods and droughts can directly and indirectly affect a nation's economy, with immediate consequences. Direct effects include damage to infrastructure, while indirect effects include an aversion to investing in at-risk areas. Meanwhile, poor water quality can impede economic growth. In turn, livelihoods and poverty also stand to be impacted: climate change renders poverty reduction more difficult by creating new poverty traps and prolonging existing ones, particularly in countries where economic inequality is on the rise.

Human health is also at risk. Climate change impacts human health mainly by exacerbating existing health problems. Examples include injury, disease, and death due to more intense heatwaves, undernutrition from diminished food production, especially in poor regions, and increased risk from waterborne diseases.

In the same way, human security stands to suffer. Climate change can increase the likelihood of conflicts by amplifying existing difficulties, including economic weaknesses, a lack of adequate infrastructure, and weak governance. As the probability of displacement increases when populations

experience higher exposures to extreme weather events, climate change is further projected to increase the number of displaced people.

Demand management and green infrastructure

To address these risks and achieve water security for all, both demand management and nature-based solutions have a crucial role to play.

Demand management involves making better use of existing water supplies before attempting to increase them further. Specifically, it promotes water conservation during normal and abnormal conditions through changes in practices, culture, and people's attitudes toward water resources. It seeks to reduce the loss and misuse of water, optimise its use, and facilitate significant financial and infrastructural savings by minimising the need to meet increasing demand with new supplies. Demand management tools include water pricing, smart water metering, and developing alternative water sources. A number of polities across the globe provide important examples of how this can be achieved:

- The City of Vancouver has a seasonal water rate, where the water rate increases during the warmer months to reflect the added cost of supplying water to the city.
- Singapore's Public Utilities Board is rolling out 300,000 smart water meters island-wide from 2022 onwards, with customers able to access hourly consumption data

- Austin Water's Onsite Water Reuse System Pilot Incentive Program incentivises the development of systems that collect, treat, and reuse rainwater, stormwater, and greywater for non-potable uses onsite.

To rise to the water security challenge, nature-based solutions will be equally essential. These involve using natural or semi-natural systems that utilise nature's ecosystem services to manage water resources and associated risks. NBS comes in various shapes and sizes and is implemented in a wide variety of contexts to mitigate the impacts of floods and droughts. A key aspect of nature-based solutions is their multifunctionality: they allow harnessing the interrelationships between vegetation and the water cycle to enhance both sustainable development and water- and greenery-related ecosystem services.

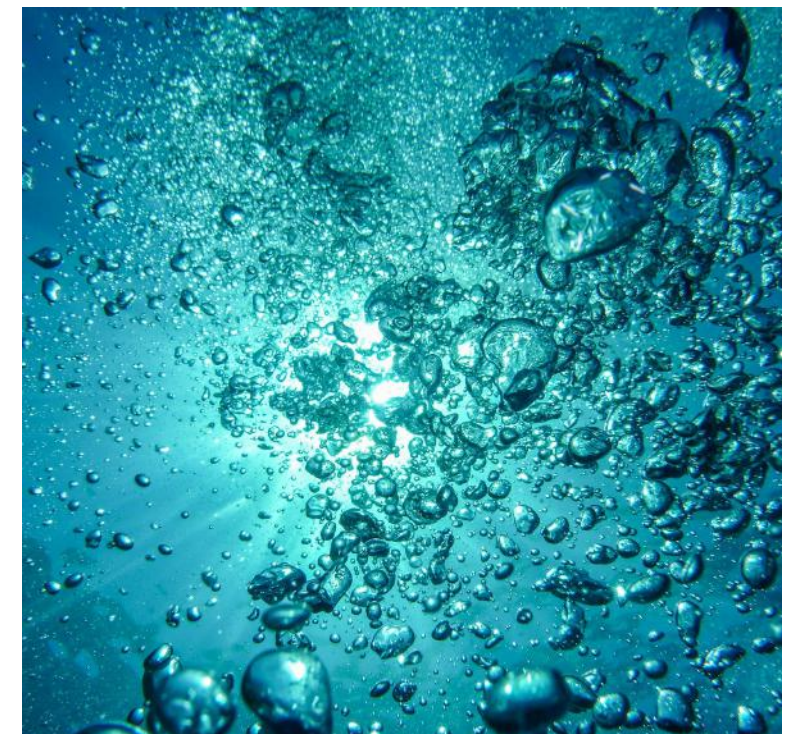
- The Hague, for instance, has launched a subsidy for the construction of green roofs throughout the city.
- In Melbourne, the government owned water utility company Greater Western Water has created a Stormwater

Harvesting Partnering Fund to help communities develop projects that promote sustainable water management and reduce demand for potable water, including projects that irrigate sports grounds and public open spaces.

- New York City's Department of Environmental Protection's Watershed Forest Management Plan protects the city's unfiltered water supply, the largest in the United States. The plan ensures diversity of forest species while protecting them from development.

In conclusion, across the globe, the summer 2021 has provided dire reminders that extreme weather events are on the rise. Yet, we are not left high and dry in the face of water (in)security. Through demand management and nature-based solutions, it is not too late to achieve water security for all, while helping protect and restore the natural environment.

*Robert is the founder of Our Future Water and Editor-in-Chief of [The Palgrave Handbook of Climate Resilient Societies](#) and [The Palgrave Encyclopedia of Urban and Regional Futures](#), published with Springer Nature. He is the author of ten books, including [Urban Water Security](#), [Regional Water Security](#), [Developing the Circular Water Economy](#), [Blue and Green Cities: The Role of Blue-Green Infrastructure in Managing Urban Water Resources](#), [The Green Economy and the Water-Energy-Food Nexus](#), [Nature-based Solutions to 21st Century Challenges](#), and [Water Resources Management: Innovative and Green Solutions](#).





Building a Smart, Resilient, Nature-Based Future

