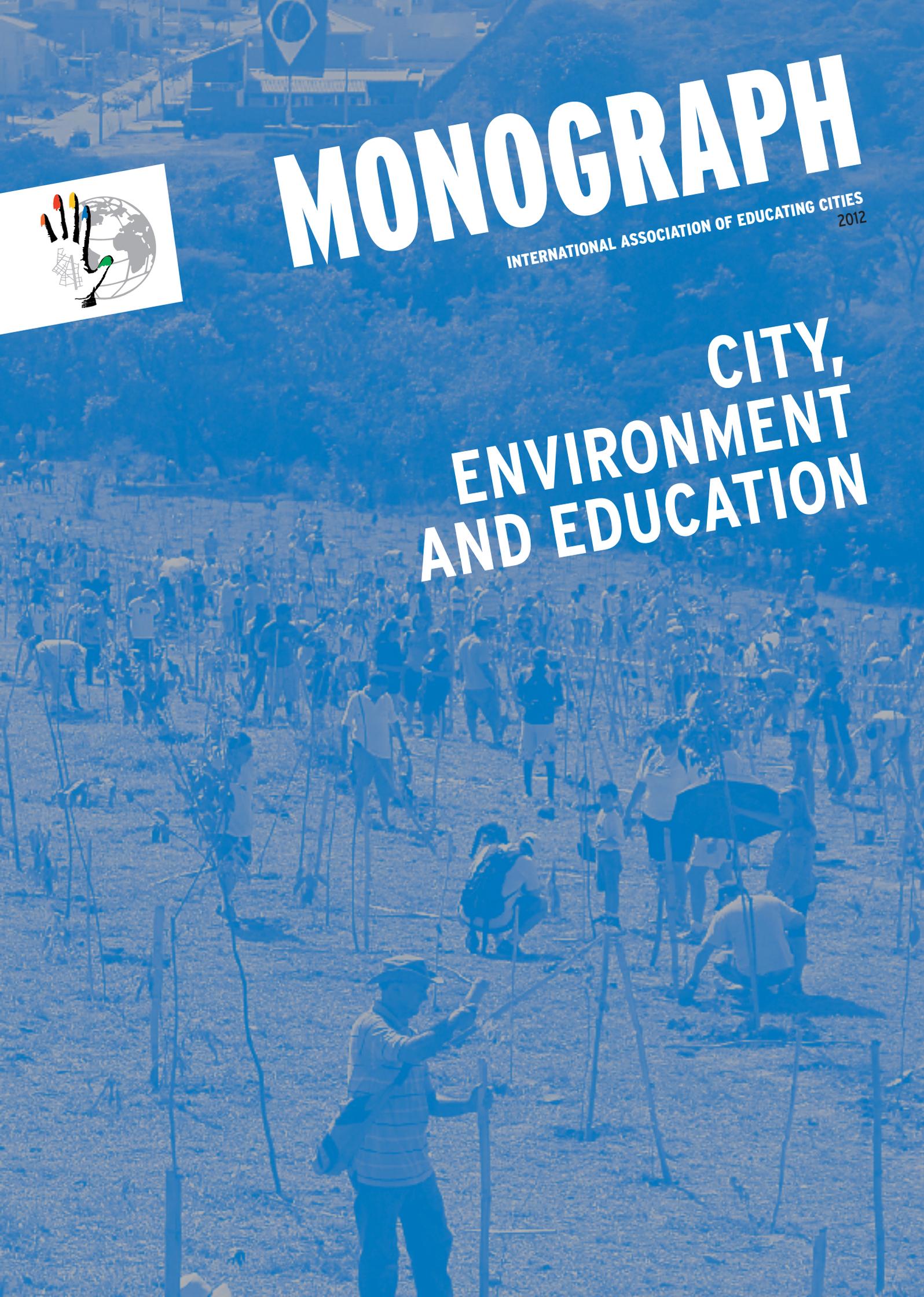


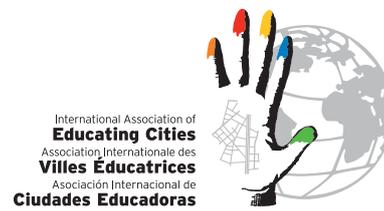
MONOGRAPH

INTERNATIONAL ASSOCIATION OF EDUCATING CITIES
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CITY, ENVIRONMENT AND EDUCATION



CITY, ENVIRONMENT AND EDUCATION



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Editorial

The expression "Agenda 21" was coined at the Earth Summit (Rio de Janeiro, 1992) to refer to the plan of action that States would have to implement in order to transform the current model for development, based on the exploitation of natural resources as if they were unlimited and with unequal access to the benefits of those resources, to a new model for development capable of covering the needs of present generations without compromising the capacity of future generations. The final document produced by the United Nations ten years ago devotes Chapter 28 to the role of cities in this ambitious resolution for change. It recognises both the responsibility of cities and their capacity for transformation.

This is, indeed, a good reason to focus the fourth monograph published by the International Association of Educating Cities on the subject of the environment; and yet another good reason is the extraordinary number of policies, projects and initiatives that have been put into place in cities to promote more sustainable development in our society. Local Agenda 21 strategies; plans to reduce and mitigate the impact of climate change; streamlining water use; new transportation options; green architecture and urban planning based on sustainable principles; protecting the natural surroundings and biodiversity; and reducing the impact of urban waste are just some examples of that. But none of these efforts would have succeeded without the parallel process of educating citizens in the values, principles and personal conduct required to encourage their participation in sustainable development.

Titled "City, Environment and Education," this monograph offers an exchange of ideas, strategic projects and experiences developed within this framework. In keeping with the structure of previous publications, it is divided into three sections.

The first section includes five interviews with respected politicians and representatives of environmental associations, offering their views on the impact of urban development on the environment and possible steps to be taken to redress resulting problems.

Joan Clos, Executive Director of UN-Habitat and former Mayor of Barcelona, among other distinguished positions he has held, discusses the main environmental challenges faced by cities and the projects currently being put forward by UN-Habitat to address and move onwards sustainable urban development.

Javier Maroto, Mayor of Vitoria-Gasteiz, Spain, named Green European Capital 2012, talks about how the city earned this prize, the involvement of its citizens in this

commitment and the future plans they have designed to remain in the forefront of the most environmentally sustainable cities.

Anne Le Strat, Deputy Mayor of Paris in charge of water, sanitation, and canal management, presents an ambitious project that she has developed to re-municipalize water management. This effort which focuses on offering environmentally friendly, well-balanced and high-quality water, has not only reduced water consumption costs, but encourages more careful use of this resource and has resulted in a significant change in water usage habits among Parisians.

Sergio Fajardo, Governor of Antioquia, Colombia, and member of the Green Party, recounts how his experience both in politics and in teaching have shown that technological and scientific knowledge, combined with ongoing citizen education and scrupulous political responsibility serve as key elements in building a more sustainable city.

This section wraps up with an interview with Vanessa Pallucchi, President of the Legambiente School and Training Association in Italy, who offers information on projects promoted by this environmental organization that has, for over thirty years, led the way in encouraging citizen participation as a means of promoting the sustainable future of Italy's cities.

In the second section of the publication, leading experts in environmental issues and city management share their knowledge and ideas.

The section opens with the article "Our Urban Environment – Challenges and Opportunities" by Jacqueline McGlade, Executive Director of the European Environment Agency, stressing the importance of good air quality, clean water, reduced noise pollution, sustainable urban design and green spaces to improve the quality of life for city dwellers. Her article provides data on how these issues are being addressed in various European cities.

Ania Rok presents key points from the "Local Sustainability 2012" study, carried out by ICLEI for the Rio+20 conference. This review focuses on the steps local governments have taken over the last two decades with regard to sustainable development and the important role they play in this global challenge.

In the article "The Role of Local Citizenship in Battling Climate Change," Cristina Narbona, member of the UN Secretary-General's High-level Panel on Global Sustainability, and Jordi Ortega, Professor at Carlos III University in Madrid, provide examples of local

groundbreaking initiatives promoting renewable sources of energy and energy efficiency. These initiatives show that a change in the development model is possible and reaffirm the key role of local agents in accomplishing global objectives.

Closing this part of the monograph is the article “Eco-Intelligent Cities: Towards a Green Urban Economy” by Dushko Bogunovich, Associate Professor of Urban Design in Auckland, New Zealand, who looks at the elements that must be taken into consideration in developing sustainable cities and stresses the role that universities must play in that process.

The third section of this publication focuses on various experiences of different educating cities. It is important to note that choosing the five cities featured here was not an easy task, given the extraordinary number of excellent projects that exist which focus on improving the urban environment. Several different criteria were applied in making the selection: first, priority was placed on embracing a broad range of subjects; secondly, was the desire to include initiatives from different parts of the world; and finally, we were interested in describing experiences with varying degrees of complexity which could serve as a model, stimulus and reconfirmation for all of the cities who could not be included in this monograph.

This section opens with the City of Munich and a description of the Bauzentrum, a center providing education and consultation on ecological housing that is meant to support the city's policies of climate protection. This center's mission is to provide information, training and advice to citizens and companies operating in the building sector regarding the options available to them to work towards the goal of improved energy efficiency and, especially, to reduce greenhouse gas emissions.

The Brazilian city of Sorocaba provides information on actions taken within the framework of the “Friends of the Environment” project, designed to raise citizen awareness of and involvement in the issue of environmental protection, with projects that range from planting trees to community-based environmental education.

The next featured city in this section is Barcelona which, in 2002 set forth its Local Agenda 21, with the aim of encouraging its citizens to join forces in creating a more sustainable city. Ten years later, we can see the results achieved, the successes enjoyed and the challenges

remaining to be met. As this article mentions, the Barcelona School Agenda 21 Program received the Dubai International Award for Best Practices to Improve the Living Environment administered jointly with UN-HABITAT.

The Portuguese city of Vila Real presents the process involved in, and results of, its ambitious project to promote biodiversity that is in line with the economic and social development of the population at large. They designed and set up a program that included raising people's awareness of the rich biological heritage of the region, citizen participation in conservation efforts and the involvement of the business community in promoting that legacy.

This section concludes with a piece focused on the South Korean city of Changwon and its ecological growth project designed to encourage - in cooperation with the business community - energy efficiency and the use of renewable energies in that city. It is an ambitious project that aims to place Changwon among the most energy-efficient cities in the world.

The monograph also includes the “Changwon Declaration,” proclaimed within the framework of the 12th International Congress of Educating Cities, which sets out five basic principles that the participating cities have committed to put into practice in the effort to move towards more sustainable urban development.

In conclusion, I wish to add some brief personal reflections. Current trends indicate that cities will experience explosive growth in the coming years; the world is - and will clearly continue to be - largely urban and must also be environmentally sustainable. We are faced with great challenges that we must address, and not only through technological advances but also through changes of habits, new governing models, new values in our relationships and a new concept of cities. The future will demand much more than smart cities, it calls for smart citizens with a sense of solidarity; this is where the principles of educating cities currently play a key and ongoing role. Sustainable development is smart development and that is only attainable through an educated citizenry.

Carles Mendieta

Director of ShareBarcelona. Former Director of the Environmental Forum Foundation and Former Vice-president of the Catalan Observatory for Sustainability.

Joan Clos

Executive Director of UN-HABITAT



INTERVIEW

Appointed Executive Director of UN-Habitat (the United Nations Human Settlements Programme) at the level of Under-Secretary-General by the United Nations General Assembly, Dr. Joan Clos took office at the Programme's headquarters in Nairobi, Kenya on October 18, 2010. Born in Barcelona on June 29, 1949, he is a medical doctor with a distinguished career in public service and diplomacy. He was twice elected Mayor of Barcelona serving two terms during the years 1997-2006. He was appointed Minister of Industry, Tourism and Trade of Spain (2006-2008) under President José Luis Rodríguez Zapatero. He served as Spanish ambassador to Turkey and Azerbaijan. At the international level, from 1997 to 2006 he was President of the International Association of Educating Cities (IAEC). In 1998 he was elected President of Metropolis, the World Association of Major Metropolises. Two years later, he was elected President of the World Association of Cities and Local Authorities, (WACLAC). Between 2000 and 2007, he served as Chairman of the United Nations Advisory Committee of Local Authorities, (UNACLA). Between 2004 and 2006, he was Vice-President of United Cities and Local Governments (UCLG). And from 1997 to 2003, he was member of the Council of European Municipalities and Regions (CEMR).

What is UN-HABITAT's primary mission? And what strategies have been defined to work towards accomplishing that task?

UN-HABITAT is the United Nations agency focused on cities and sustainable urban development. With more than half of the world's population living in urban areas, there is no question that cities lie at the heart of the challenges facing the world in the 21st-century; and the opportunity is there to shape sustainable, prosperous and socially egalitarian cities.

Our agency is working to achieve a flexible structure in its projects in order to be prepared to face future urban challenges. UN-HABITAT concentrates on three main areas: urban design and planning; the economy and job creation; and regulating local policies.

UN-HABITAT's activities always look towards the longer-term future. What are the main challenges for 2020?

Cities will be experiencing rapid growth in the coming decades, particularly in Southeast Asia and Africa, where we know that six out of ten people live without such basic services as water and sanitation. The challenges facing the cities of the future are climate change and its effects, energy consumption and social inequality.

UN-HABITAT's activities are developed with a view to confronting these challenges. Along these lines UN-HABITAT is participating in the organization of Habitat III, the third United Nations conference on housing and sustainable urban development, scheduled for 2016,

with the aim of establishing a new urban agenda that encompasses all of the challenges facing our cities in the future.

How does UN-HABITAT reinforce the idea of decentralization and the role of local governments in encouraging more sustainable urban development?

Local governments are responsible for carrying out good local governance based on the principles of sustainability, efficiency and transparency. Nonetheless, the influence of cities goes beyond the bounds of local administration, so it is important to create metropolitan networks at the regional level and encourage local involvement in national policies. UN-HABITAT stands behind good governance at all levels: local, regional and national.

What criteria could help cities to become more sustainable?

The only criterion for the new 21st-century cities, and particularly developing cities, is to create sustainable urban areas based on the three main pillars of the "sustainability" concept: that is, the environmental, social and economic elements.

This new paradigm that UN-HABITAT is applying, means creating an urban model that will allow cities that are growing –and most of those in developing countries, where we find the majority of mega-cities with over 10 million inhabitants– to shape a sustainable future, which includes integrating the poorest among the population into the city dynamic in order to achieve social cohesion and equality.

What are the main urban environmental challenges in the coming decade and how necessary is citizen education in meeting those challenges?

As cities grow, their responsibility with regard to climate change increases. Calculations show that urban areas are responsible for 70% of greenhouse gas emissions.

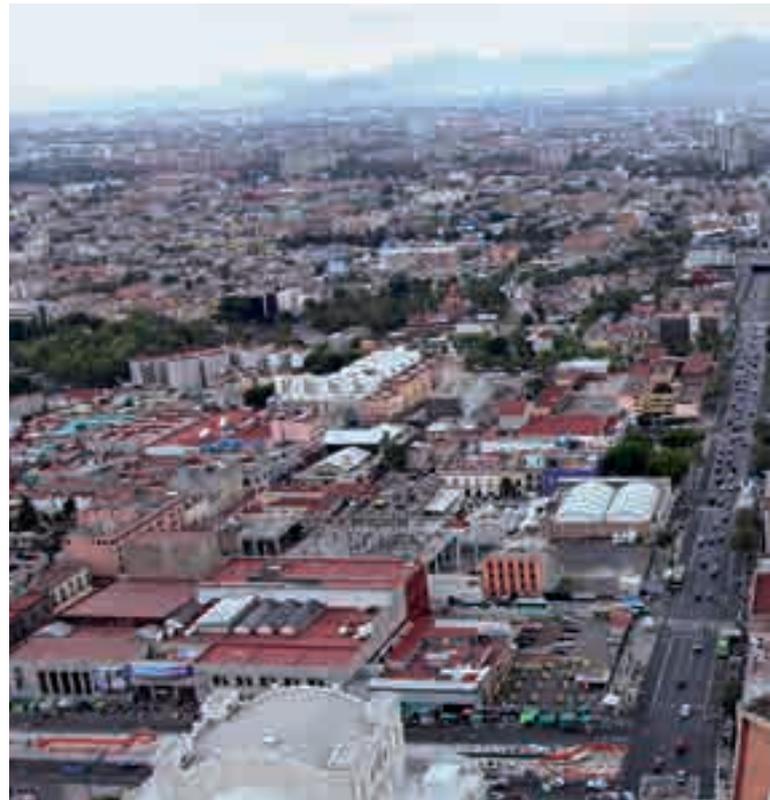
But this very same concentration of people in cities offers a great opportunity to change the trend. Many cities are developing innovative programs to prevent climate change effects. We see examples of this in group transportation services such as metabuses and metropolitan transport systems, and the use of renewable energy.

Citizens' involvement is essential in achieving this change. In this regard, UN-HABITAT has launched a campaign called "I'm a City Changer" to encourage individual efforts on the part of citizens to improve our cities.

What is the aim of the UN-HABITAT "Cities and Climate Change Initiative"?

In 2010, for the first time ever, most of the people affected by natural disasters linked to climate change, lived in urban areas. Cities with little infrastructure, particularly with regard to sanitation, drainage and building safety are the most vulnerable to the effects of climate change. It is expected that in the next forty years 200 million urban dwellers will be displaced due to climate change. The prediction for Latin America is 12 million people, just between now and 2020.

The "Cities and Climate Change Initiative" focuses on risk prevention. It aims to strengthen local capabilities to



Panoramic view of Mexico City. © Julius Mwelu/UN-Habitat

counteract the impact of climate change in cities, through territorial planning and urban environmental management in order to achieve sustainable urban development.

What is the aim behind the Best Practices Database and the Best Practices Awards?

Recognizing best practices is one way to share positive urban initiatives among cities. UN-HABITAT encourages knowledge exchange between cities through the Best Practices Database and other programs. In addition, every

Haiti after 2008 Earthquake. © Alain Grimard/UN-Habitat



Residential houses submerged at Nowshera and Chasd Districts, after flood in Pakistan. © UN-HABITAT Pakistan





Panoramic view of Nairobi, Kenya, where the Headquarters of UN-HABITAT are located. © Julius Mwelu/UN-Habitat

year on World Habitat Day, UN-HABITAT awards the Scroll of Honour Prize for best urban practices.

Does UN-HABITAT have specific programs designed to encourage young people's involvement in creating more sustainable cities? What is the Urban Youth Fund's role in this regard?

Most young people in the world, between the ages of 15 and 24, live in countries where at least a third of the population survives on less than \$2 per day. Given the

current trend of urban population growth, predictions are that in 2030, young people will account for over 60% of city dwellers. They represent the future of our cities, and the driving economic and social force behind them.

Thus, the Urban Youth Fund is one of UN-HABITAT's main programs. It was established in 2007 and supports organizations led by young people working on urban sustainability and economic development at the grass roots level.

Since its inception, this Fund has provided support to 178 organizations in developing countries.

Visit to Kibera, the largest slum in Nairobi and the second in Africa
© Julius Mwelu/UN-Habitat



What is the link between the UN-HABITAT projects and the guiding principles of the Educating Cities?

Educating Cities and UN-HABITAT share the same goal, which is to improve citizens' quality of life. Education is a key element in shaping good cities. ●



Javier Maroto

Mayor of Vitoria-Gasteiz, European Green Capital

INTERVIEW

Javier Maroto is the Mayor of Vitoria-Gasteiz. He holds a degree in Economics and Business Studies from the University of Deusto and a Master's degree in Management and Public Administration from IESE Business School. Before setting out on a political career, he worked for several companies linked with new technologies. Following the Popular Party's victory in the 1999 local elections, Javier Maroto became Deputy Mayor and Head of the Treasury Department, a position he held from 1999-2007. From 2008 to 2011, he was the opposition leader in the Vitoria-Gasteiz City Council, as the Popular Party spokesperson. He has been Mayor of Vitoria-Gasteiz, the capital of the Basque Country, since June 2011.

What does being named European Green Capital mean for a city such as Vitoria-Gasteiz?

Being the European Green Capital 2012 is an exciting challenge, offering Vitoria-Gasteiz a unique and historical opportunity to promote and develop its future. It provides the chance to position ourselves with a high-profile identity associated with the environment that is a "brand image" we have been aiming for and one clearly recognized both within our city and beyond its borders.

The "green prize" has opened future opportunities for our city. This designation is going to put Vitoria-Gasteiz on the map, attracting the organization of events to our city, promoting activity in the commercial and hotel sectors, and drawing thousands of tourists from around the world. But, most importantly, it will stimulate employment. In this time of economic crisis, this provides us with a great opportunity to create new jobs.

When you were handed over the Green Book at the European Parliament you said: "Vitoria-Gasteiz will be at the forefront of the 21st-century green revolution, so we are very proud to receive this award that recognizes the work we have accomplished over the past three decades." What are the city's main achievements in this regard?

The European Commission's Green Capital award recognizes those cities that have systematically respected environmental norms, are committed to establishing new goals for a better environment and sustainable development, and can act as a model and inspiration for other cities. Vitoria-Gasteiz was chosen, among other reasons, because of its projects aimed at mitigating climate change; the local transport network and Sustainable Mobility Plan; its focus on the maintenance and improvement of biodiversity, an example of which is the city's Green Belt; the maintenance of air quality and noise control in the city; the comprehensive Waste Management Plan; and the comprehensive Water Conservation Plan.

What does this green revolution mean for the city?

It means that, as of today, we are a reference point on environmental issues, for the Basque Country, the rest of Spain, the rest of Europe and the world at large. From now on, what we do in Vitoria-Gasteiz will serve as a mirror for the world.

We are developing an ambitious program focused around twenty specific initiatives for 2012 and ten big strategic plans to continue placing Vitoria at the forefront of developing environmental policies during this decade. We are proud of this program that will serve us well as we confront this challenge.

La Senda Park is an approximately five-kilometer walk. © City of Vitoria-Gasteiz



Could you tell us about some of the European Green Capital programs that have been planned to promote citizen awareness?

The Vitoria-Gasteiz European Green Capital 2012 program features the city and its people. We want to promote citizen participation, stimulate thought on issues, encourage research and develop innovative ideas about the green city of the future; we want our city to represent the good practices and values behind the European Green Capital prize and project an image of a green city that does things differently.

The Ekolabora program is a model of citizen participation and designed for citizens of the Green Capital to actively take part in the process and thus become its best spokespeople. It began as a volunteer effort that intends to be the seed of an on-going collaboration that will continue beyond 2012.

Throughout the course of this year we also want to support the "greenest" ideas generated by the citizens themselves through green projects intended to promote broader awareness and knowledge of environmental

issues. Individuals, associations and different entities can participate in this open contest to select the best projects to be developed in 2012.

On a different front, the Thematic Weeks program aims to raise people's consciousness about ecology and provide information and encourage reflection on green issues: challenges and solutions to energy questions; the European green week; sustainable mobility and the future of our lands; biodiversity; landscape; and diet.

In addition the Green Pact program provides companies with the opportunity to further develop their environmental commitments, share their experiences and achieve a competitive advantage. The participating companies will be honored and accredited as members of the Green Pact and part of the European Green Capital 2012.

Finally, Vitoria-Gasteiz will become a center for debate, reflection and awareness regarding the environment, hosting technical conferences with international experts on subjects such as water management, landscape, sustainable architecture, and energy.

Most of the Vitoria-Gasteiz tram line travels on green surface. This ecologically sustainable, non-polluting tram is a symbol of "green Vitoria."
© City of Vitoria-Gasteiz



Have you seen a change in citizens' behavior as a result of these projects and the information provided to them?

The European Green Capital prize belongs to everyone and people here are very committed to the idea. All of us in Vitoria-Gasteiz are "green." We are very proud and excited about this award and everyone in Vitoria is invested in it and in its importance.

It is recognition of over three decades of commitment to sustainability and a prize awarded to all of the citizens here who, through our good practices, have managed to empower our city to the point where we feel it is worthy of the Nobel Prize for the Environment.

The citizens' role is essential. The work done by political groups, neighborhood associations and environmental groups as well as private companies, commercial enterprises and individuals, has been crucial. The City Council has devoted a great deal of energy to involving people through, for example, the citizen's participation process that was a part of the city's Sustainable Mobility Plan and through educational

efforts in the public schools and publicly-funded private schools.

Could you describe the main mobility-related changes that have taken place in the city, and how citizen participation has played into these changes?

We have a Sustainable Mobility and Public Space Plan in place in Vitoria-Gasteiz, through which we have introduced certain changes in the use of public transport and bicycles; we have restructured and strengthened the city bus network in coordination with the tram; pedestrian areas have been expanded; and we have added a safe and operative series of bicycle paths. To be precise, the main changes have resulted in a 28% reduction in private automobile use, due to the fact that three times more people are now choosing bicycles as their means of transport and more individuals are using public transportation.

During the course of a year we involved different groups – environmentalists, cyclists, business owners, hotels and schools, and others – who now form part of the





El Norte Park is a path starting in Bilbao Square, one of the entrances to the Old Town. As part of the Sustainable Mobility Plan, this tree-lined walk has been leveled and expanded for pedestrian use.
© City of Vitoria-Gasteiz.



Ataria, which opened in 2009, was a finalist for the 'Best Building of The World' Award. From the Salburua Wetlands Center we can see migratory birds and the natural elements in this environment.
© City of Vitoria-Gasteiz.

citizens' Pact for Sustainable Mobility and help put these changes into action.

Could you explain what the "Green Belt" project is?

We have a Green Belt in our city covering more than 640 hectares, and with the aim of reaching 960 hectares, which is the result of an ambitious environmental restoration and recovery program in the city's outskirts. Right now this involves five parks: Armentia, Olarizu, Salburua, Zabalzana and Zadorra. We are still working to include other peripheral areas as well as continuing to link these spaces through environmental corridors.

Now Vitoria-Gasteiz has the great aim of bringing nature in its purest form into the city. We are calling this challenge the interior Green Belt. It is a groundbreaking project that will turn various main thoroughfares in Vitoria-Gasteiz into new energetically sustainable urban corridors. The first phase begins this year on Gasteiz avenue, featuring wild vegetation. We will gain more pedestrian space and bring in flora, fauna and streams to create real natural spaces.

The Center for Environmental Studies is one of the important elements within these environmental projects. Could you tell us about some of the Center's main programs, and particularly those related to raising awareness of the subject in citizens of all ages?

The Center for Environmental Studies offers a broad program of activities focused on providing information

and sensitizing people to participate in environmental issues and sustainable development.

The program, designed for the public in general, includes exhibitions and celebrations of specific days of recognition: World Wetlands Day; Biodiversity Day; Environment Day; Migratory Bird Day, etc; publicity campaigns supporting projects such as the Bicycle Mobility Master Plan; screenings of films on environmental topics; leisure activities on environmental gardening; the planting and distribution of native trees and bushes; lectures; technical conferences; and walking tours and family activities offered by the Ataria Nature Center and the Dehesa House within the Olarizu park.

In addition, there is the program designed for school children and developed in conjunction with the private local water company AMVISA, which offers up to 14 activities throughout the school year.

One of the strategies put forth is "Governance for Change." Can you provide some details about what that involves?

Good governance is necessary in order to achieve more sustainable development. This new governance for sustainability must include the cities where we have the task of initiating new projects that are committed to change, with the aim of also drawing in higher levels of the government. In order to reach these goals we must work towards a broad political consensus which, I believe, is fundamental.

Being sustainable is more economically efficient. It is



La Florida Park was conceived as a large 19th-century French-style botanical garden. It features hundred-year-old trees of 95 different species.
© City of Vitoria-Gasteiz.

about improved management of economic resources. Sustainable cities work better and sustainability is a way of achieving more with less. The Environment is the future, it is about quality of life, making the best of available resources and encouraging a new sustainable style of urban living.

Eighty percent of Europeans live in mid-size cities such as Vitoria-Gasteiz, so our experience as a Green Capital can serve as an example to other cities regarding land-, waste-, and water-management, air quality control as well as economic criteria.

How do the projects developed within the European Green Capital framework fit in with the principles of Educating Cities?

Within the program we have set up as European Green Capital 2012, is the Ekolabora citizen participation project that we mentioned earlier. There is also the green factory program that involves environmentally-aware factories in the cities that open their doors to visitors. Examples of this are the Salburia Wetlands, the Ataria Nature Center,

civic centers within the city and waste and water treatment plants. In addition there are private companies eager to show how their green factory operates.

And then there is School Agenda 21 project that the City Council has been developing over the past years and which now also includes several other European schools. This initiative aims to heighten students' awareness of the environmental issues in their surroundings and give them the information they need to be responsible citizens participating in a more just and ecologically sustainable society.

During 2011-2012, Vitoria-Gasteiz is supporting the development of a European network of schools and cities participating in the School Agenda 21 project, as a source of information and knowledge exchange. This year 39 secondary schools are taking part in the project, 24 of those from Vitoria-Gasteiz, 4 from other cities in Spain, 5 from France, 3 from Germany and 3 from Romania. ●

A portrait of Anne Le Strat, a woman with short dark hair, wearing a dark V-neck top. She is standing in front of a large leafy plant on the left and a wall with framed pictures on the right. The entire image has a blue color overlay.

Anne Le Strat

Deputy Mayor of Paris in charge of water, sanitation,
and management of canals, and President of Eau de Paris, France

INTERVIEW

Anne Le Strat (environmentalist, ecologist, allied with the Socialist Party) is Deputy Mayor of Paris in charge of water, sanitation, and management of canals, and President of *Eau de Paris*. As a member of the Paris City Council since 2001, she sits on several different bodies: She is Senior Vice President of the Interdepartmental Wastewater Authority for the Greater Paris Area (SIAAP, *Syndicat interdépartemental pour l'assainissement de l'agglomération parisienne*), Vice President of the River Basin Association for the Seine Great Lakes (EPTB, *Établissement public territorial de Bassin - Seine Grands Lacs*), Vice President of the Île-de-France Mayors' Association, and Board Member of Ports of Paris. Anne Le Strat is also President of Aqua Publica Europea, an association that brings together public water and sanitation services in Europe.

The City of Paris chose to remunicipalize its water service. What led to this decision after 25 years of private management?

The previous system of delegating water distribution to the private sector was complex, opaque, and did not allow local authorities to have real control of their service and truly ensure its efficiency. In 2007, considering that the concession contracts expired in December 2009, the City of Paris decided to carry out a series of research studies and hold an open discussion in an attempt to find the most suitable management model. We chose to have one single public water service, because that was what

seemed most appropriate for offering Parisians the best-quality water at the best possible price.

Ever since it was established on January 1, 2010, *Eau de Paris*, a public company, has been managing the entire water network, all the way from the intake point to the consumer's tap. It was both a political and a management decision. It was political because it was based on the strong conviction that water, a common good, cannot be considered as a marketable resource. And it was a good management decision because from an economic and technical standpoint, having one single public company instead of the former three private firms enabled us

Parisians have access to high-quality, well-balanced water that is, on the average, 300 times cheaper than bottled water, and up to 1,000 times better for the environment.



to streamline water management in everyone's best interest.

Over the twenty-five year period of privately-managed water supply, the Paris authorities were unable to have financial and technical control of the service. Since then, we have taken back the helm and now control the entire small water cycle to guarantee better monitoring of the service, integrating long-term environmental and heritage considerations that are not always compatible with a short-term, strictly financial rationale.

Offering the best possible water at the best price is one of the public company's goals. Has the new management model had an effect on Parisians' assessment of their water service? What strategies are being used to raise awareness and inform about this service?

The 2012 water survey, which will be published soon, will enable us to get a better sense of the ways in which our users assess their water service and perceive this new management model. What we do know is that right now, the residents of Paris, most of whom live in apartment buildings and pay their water bills indirectly through maintenance charges, are more concerned about the water's quality than about its price. What we have also learned from our exchanges with Parisians, such as the ones we had during the campaign held in June 2011 in city markets, when water rates went down 8%, is that the notion of a public water service is important to most of them.

The reform we have undertaken is appreciated in principle. But we hope to venture further, making our users the main focus of this new public service. That is why we decided from the start to include them as members of the Executive Board of Directors of *Eau de Paris*, and associate them with the service's management through the Paris Water Observatory (*Observatoire Parisien de l'Eau*), a municipal body of participatory democracy. The Observatory meetings are public and open to everyone, but to reach the largest possible number of people, we approach Parisians on a regular basis from our *Eau de Paris* stands in the city's markets. Our aim is to answer any questions they may have and encourage the use of tap water - which is cheap, environmentally friendly, and well-balanced.

What is the reason for not recommending the use of bottled water? Why is tap water better for the environment and how do you really achieve an increase in drinking water consumption in the public network?

Parisians have access to high-quality, well-balanced water that is, on the average, 300 times cheaper than bottled water, and up to 1,000 times better for the environment because it does not generate any plastic waste. Plastic



La Pétillante fountain opened in Paris on September 21, 2010 in the Reuilly park in the 12th arrondissement. It is the first public fountain in France to offer sparkling water on tap. The fountain is part of the public water company's efforts to promote drinking tap water.

bottles account for an enormous volume of waste, from 10 to 20 million m³ a year in all of France. Only 50-60% of those bottles are recycled. Tap water, on the other hand, is environmentally friendly, because it requires no packaging. It does not generate any plastic waste and does not involve separating household waste into different bins. This means about 10 kg of waste are saved per person each year. In addition, tap water is delivered directly to each home, with no need for transportation. So it makes sense to recommend its use, particularly considering that in Paris we are fortunate enough to have affordable, environmentally friendly, safe, well-balanced water straight out of the tap. This is the message we are trying to convey, knowing that the water we drink is only 1% of the tap water we use, and that we are not concerned with our market share or our turnover. As a matter of fact, we are encouraging citizens to use water sparingly so as not to be wasteful with this resource. Our aim is not to stimulate an increase in drinking water consumption, but rather to have tap water take precedence over bottled water, which is dreadful for the environment.

How do you guarantee the quality of drinking water in households and public fountains?

We guarantee it by constantly monitoring our water quality throughout its entire cycle (intake from the natural source, treatment, transportation, distribution), and with additional testing by an external, independent laboratory that is approved by the Ministry of Health. With its



On the average, a drop of water has been tested ten times along the way from its intake point to the user's tap.



Creating a water solidarity allowance and giving homeless people jerry cans and maps for locating public fountains are some of the efforts being carried out by the public water company to ensure citizens' right to water.

population of 2.2 million, Paris is the city with the largest number of health inspections in all of France. Every year, there are actually over one million quality measures taken to ensure monitoring of the tap water quality for Parisian consumers and the city's fountains. On the average, a drop of water has been tested ten times along the way from its intake point to the user's tap. *Eau de Paris* always keeps a close check on its health standards, delivering very high-quality water that meets the 56 requirements for drinking water stated in the French Public Health Code.

Could you tell us what is being done to ensure that water management is a fair public service for all?

In Paris we strive for solidarity - providing fair public service - by pursuing more than what the current legislation requires in order to truly ensure each citizen's right to water. In fact, without waiting for the government to move on this issue, when we recovered public management of the water system we introduced preventive support to back up the household aid that was being provided by the city. This water solidarity allowance was the first in France and helps out households that are having difficulty paying their water bills. More than 40,000 homes benefited from this allowance in

2011. Aside from this preventive support, we have taken measures aimed at the entire user community by cutting back the price of water in July 2011.

Meanwhile, we have also been pursuing more specifically targeted social efforts. For instance, *Eau de Paris* has doubled its contribution to the Housing Solidarity Fund (*Fonds de Solidarité pour le Logement*), providing € 500,000 from now on for this fund that allocates aid to help disadvantaged families with their housing expenses, particularly concerning their water bill payments. Also, based on the assumption that the most socially responsible water is the water we do not waste, we will be installing 15,000 water-saving kits in social housing rental units, with support from Paris-Habitat. This measure has both social and environmental benefits, because it should lead to an average 15% drop in water consumption and savings of about € 100 a year per household in water and energy bills. Lastly, we are working on a large number of efforts to provide access to water in the streets, such as distributing jerry cans, cups, and maps for locating public fountains to homeless people through the associations; more recently, we handed out 4,000 water flasks in the summer. The 1,200 drinking water fountains located all around Paris provide access to free, high-quality water for everyone. ●

Sergio Fajardo

Governor of Antioquia, Colombia



INTERVIEW

Sergio Fajardo was born in Medellín, Colombia. He is a mathematician at the University of the Andes, with a Master's degree and a Ph.D from the University of Wisconsin at Madison, and a Doctor Honoris Causa degree from Menéndez Pelayo International University (Spain).

He held several positions in scientific institutions in Colombia, such as the National Council of Basic Sciences and the National Commission on Masters and Doctorate Degrees. Sergio Fajardo was on the Board of Directors of the Foundation in Support of the University of Antioquia and was Director of the Science and Technology Center of Antioquia.

In 1999, he left his teaching post at the University of the Andes, in Bogotá, to return to Medellín and lead an independent citizen movement aimed at reaching the City Council. In 2003 he was elected Mayor of the city, receiving the highest number of votes to date for that office. With the slogan *Medellín, the Most Educated*, Fajardo was at the forefront of the city's most important transformation, for which he received various awards, including his designation as the Best Mayor in Colombia for 2004-2007.

After leading a new campaign throughout the entire Department of Antioquia, he was elected Governor for the 2012-2015 term, with the highest number of votes in the country's history for this office.

***Antioquia, the Most Educated* is the slogan for your current political effort in the Department, the same one you used in carrying out changes in Medellín. Is education the key to sustainable development?**

Without a doubt. Eight years ago, when we came into office, we never could have imagined that we would end up leading social change from inside the public administration. Our initial idea was to effect change through education, including science, technology, innovation, entrepreneurship, and culture. Given what I have seen over these years, I am more and more convinced of the importance of education as a means to inform, to train, and to effect change.

Now we are entering a new stage in terms of how we carry out our political practices, but 12 years ago, when we first went out into the streets of Medellín with the Citizen Commitment movement, environmental concerns and the concept of sustainability were just beginning to take hold. We had not visualized it clearly yet and it was not part of the agenda in our society. Now, however, I am sure that it is a fundamental concept and I can affirm that education is the key to sustainable development.

What would you consider your main achievements in terms of environmental management in Medellín?

We started a citizen awareness process in Medellín, which is still ongoing, that began by acknowledging the value of public space as a key element for change, perceiving it as an urban space in which people could come together. We started off by thinking about what kind of a city we needed in order to improve our quality of life,

and that soon led us to an increased awareness of the environmental issue, but as I mentioned before, that was still in the budding stages.

The natural environment in Colombia is lush and Medellín is particularly striking in terms of its vegetation. But in spite of this richness – and it is not easy to admit to this – we were raised as predators, and it has taken us some time to gradually advance towards permanent environmental awareness. Issues as simple and apparently easy to deal with as separating waste – for instance, what kinds of waste we have, how we teach citizens to separate it, and so forth – really require an ongoing education effort.

In Medellín we recovered areas for citizens' use; for example, we rebuilt the Botanical Gardens and turned them into a public space in which citizens could gather. The environment was one of our concerns in the process of opening up new public spaces.

To offer another example, we started building the Arví park and considered how to include our mountains in our cityscape. So we embarked in a direction that we now view as essential: building a green belt around the Aburrá valley, which is now called the Central Park of Antioquia, including more than 50 municipalities. We are carefully and deliberately working to protect our water resources and to preserve several sections within this lush area; we are going to create new opportunities and alternatives for farmers, and raise awareness of the need for increasingly clean, environmentally friendly production. We have also made progress in protecting the river, a structural hub for the entire valley.



Ebéjico City.



Panoramic view of the Department of Antioquia.

All of this is to say that we are learning and moving ahead, and that we are generating environmental awareness. There is one thing I often like to point out, which is that younger generations are being raised with a greater awareness of environmental issues and sustainability than was the case in my generation.

Our goal in the political arena is to identify the issues so we can put them on the public agenda and act accordingly. And that is what we are doing. We are taking giant steps, but we still have a long way to go, and as leaders we must be able to listen to and understand those groups of people who have been raised with the environmental values that we did not have when we were growing up. So, in this regard, I believe that leading means being capable of understanding the new voices that are talking to us about the importance of environmental issues and that are demanding greater awareness on our part.

Many cities have a very high environmental impact. Is it possible to change the model just with technological improvements or is it necessary to make changes in society through education in order to alter people's habits?

Both elements are significant and happen simultaneously. I understand the importance of technology, scientific

development and a growing understanding of what is happening on our planet and in our society, bringing to our attention information that did not exist before. For example, a few years ago we did not even have basic information about noise levels, pollution levels, different kinds of pollution, and so forth.

Technology, science, citizen participation, and greater consciousness of environmental issues are bringing on changes much faster than I could have imagined. All of these components are necessary and now there is no way to separate technology, information, education, and participation. This environmental awareness is going to inform our work and political demands will be greater, enabling those of us in leadership positions to have clearer goals.

One of your recurrent concerns as a politician is your interest in young people and in awakening their commitment to society. What results come to mind from your political efforts in this respect?

We have made the most progress in raising awareness regarding the importance of public education as the first step towards effecting change in our society. It seems obvious and easy to repeat in political speeches, but it does not always translate into specific actions. And we have done it. Making education a fundamental



right is a privileged tool for fighting against deep social inequality, against the violence we have been caught up in for so long, and against the culture of lawlessness that slowly trickles down into society. And in this respect I want to mention that drug trafficking, in addition to creating social conflict, is also a major predator of the environment that has not been quantified and passes unnoticed.

Getting back to the question, I believe the key is to raise awareness about the importance of education, promoting talent, people's potential, technology, innovation, entrepreneurship, and culture as a project for the society we want to build together. First of all, we have to raise awareness in order to then turn it into a citizen's right and understand the role of government in transforming society. When you give people the tools for progress in developing their potential, there is no turning back.

How do your political efforts tie in with the principles of Educating Cities?

I will start off with a personal comment. I was interviewed by a local newspaper and the journalist used a statement of mine as the title for the interview: "As Governor, I

am the main educator in this region." I have no doubts that in politics, those involved in government – mayors, governors – play the main role in education in our society.

When we meet with mayors from the different regions in our Department, I tell them: "You are the most important people in this town, because you were elected directly by the citizens, but you also have the greatest responsibility. And that responsibility implies transparency, honesty, and a commitment to education as a means to effect change."

I have been, am, and always will be a teacher. My ongoing commitment is to citizen education, to knowing how to communicate concepts so that anyone can understand them, no matter how complex they may be. A good political leader must also be a teacher, explaining things clearly and creating an atmosphere of trust – the kind you get in a classroom with a good teacher who loves what he or she is doing and is fully committed to the job. That is who I am, and that is what we are doing in public office, which is often an aggressive environment but, nonetheless, always makes for a fascinating experience. ●



Vanessa Pallucchi

National President of Legambiente School and Training, Italy

INTERVIEW

Vanessa Pallucchi is the current National President of Legambiente School and Training (*Legambiente Scuola e Formazione*), a professional association of teachers and educators within the Legambiente, the broadest-based environmental organization in Italy. She is also a member of the Scientific Committee for the UN Decade of Education for Sustainable Development. Born and currently living in Umbria, she chaired the Legambiente regional organization there from 1999 to 2007 and set up a regional network of Legambiente Environmental Education Centers. Since graduating in philosophy she has amassed professional experience in green economics and environmental education. Pallucchi has edited several types of environmental education materials for both teachers and children. She has also taken part in several European projects aimed at innovative teaching and dissemination of good educational practices on the environment.

Legambiente has become a benchmark for Italy's grassroots environmentalist movements. What are your association's aims?

Legambiente is a grassroots political movement set up as an association for environmental and health protection aiming to establish a development model that is more environmentally, culturally, socially and economically sustainable. As the broadest-based environmental association in Italy, it combines a strong local presence with a synergistic network of international relations that reaches out beyond the country's borders. When first set up in 1980, its ambitious agenda was to build a new sort of environmentalism beyond the nature-oriented conservationism then prevalent in Italy - an environmentalist movement that would grapple with a purely growth-driven development model, spreading its influence and mainstreaming a fairer, more sustainable model.

Human action and human beings' evolving relationship with the environment are the main focus of our thoughts, ideas and actions, which we base on scientific argument rather than any kind of fundamentalist ideological stance. Scientific knowledge, technology and research have been the pillars and mainstays of Legambiente's actions from its inception.

We see our association as a locally rooted body that intermediates between citizens and policymakers, working to make the world a better place by relying on fair, farsighted, sustainable management of public goods; cultural mainstreaming of environmental concerns, and the defense of legality and social cohesion.

Above all, Legambiente is a locally based organization - a national network of local nodes kept together by thousands of grassroots volunteers. Nearly a thousand local centers ensure that we play our

fundamental role as guardians of environmental quality, preserving the land by promoting good practices and local features.

Which spheres does Legambiente operate in and what instruments does it use?

Legambiente has always endeavored to provide a cross-cutting picture in which the environmental culture is not a niche but rather another dimension in a comprehensive reading of how social and environmental processes interact.

We therefore have many spheres of intervention, forms of expression and modes of action. Tracking environmental issues on the spot, collecting and processing data with the assistance of specific monitoring centers, and publishing the information obtained in dossier form are among the most effective approaches used by Legambiente to draw public attention to environmental and land-management issues. The information and communication tools we use range from the traditional (such as leaflets, brochures and magazines) to the technological (such as websites, newsletters and social media).

Legambiente works with a vast and varied network of social, institutional and economic bodies to generate synergies and to bring growing numbers of people on board for the necessary change to happen. Legambiente operates throughout Italy at a grassroots level thanks to its local presence - primarily its local Circles (i.e. groups of volunteers) and also its Environmental Education Centers, the nature protection areas of the Natura Network, the FestambienteNet festival network and the Legal Action Centers. Local organizations ensure the protection of the land, enhance local features and promote environmental culture.

What factors have led Legambiente to focus on improving quality of life in cities?

The chaotic surge in construction in the last few decades along with the sheer destruction of the urban fabric in Italy have led to higher land consumption, emptied many historical city centers, spawned ugly suburban housing projects and increased traffic and commuting.

All of this has increased air and noise pollution and degraded living conditions for urban residents. Concrete approaches to more livable cities involve refurbishing buildings and improving their energy efficiency; focusing on public transport and cycling, and managing waste and utilities more efficiently and sustainably. Citizens and mayors can become active in the struggle against climate change through Climate Agreements. That was the aim of the multi-pronged approach adopted by Legambiente. We have been promoting people-friendly cities through a variety of approaches ranging from the Urban Ecosystem Report (*Rapporto Ecosistema Urbano*) - a report on the state of Italy's main cities - to the Sick Air (*Mal'Aria*) and the Green Train (*Treno Verde*) campaigns against smog and noise pollution; the Child Ecosystem (*Ecosistema Bambino*) dossier addressing urban livability for children and teenagers; the 100 Streets to Play (*100 Strade per Giocare*) campaign to recover urban spaces, and the Little Giro of Italy (*Giretto d'Italia*) soft mobility campaign.

What information can be found in the Urban Ecosystem Report and how does it influence environmental management in cities?

The Urban Ecosystem Report is a Legambiente report drafted with scientific support from the Italian Institute

for Environmental Research (*Istituto di Ricerche Ambiente Italia*) and published with support from business daily *Il Sole 24 Ore*. Now in its nineteenth year, it was the first study in the world that ever attempted to structure urban environmental data as the basis for sustainability assessment and environmental performance benchmarking.

Every year, the report collects 125 environmental parameters by interviewing and surveying local authorities in each provincial capital as well as gathering input from other statistical sources. The resulting 125,000 datapoints are subsumed into 26 environmental quality indicators under three major headings. Pressure indicators measure the environmental burden of human activities (e.g., drinking water, fuel and electricity consumption, solid urban waste and car ownership rates). State indicators measure physical environmental quality (e.g., smog and water pollution). Finally, response indicators measure the quality of local government policies or policies implemented by the city at large (e.g., water distribution losses; water treatment; selective waste collection; public transport; pedestrian areas and traffic-restricted zones; bicycle lanes; green areas; private- and public-sector environmental management; renewable-source-promoting energy policies, and environmental quality monitoring).

Finally, a compound score based on all these indicators allows us to rank Italian cities according to good environmental practice.

Measuring the impact of this urban ecosystem report on individual local governments' environmental policies is no mean feat. However, we have been able to measure

A sit-in held outside the Montalto di Castro power station just before the nuclear referendum on 12-13 June 2011, to avert the risk that Italy might revert to nuclear power.



how authorities' attention to the issues addressed in the report has evolved over the nearly 20 years since it was first published. Awareness has grown exponentially among local government technical experts and decision-makers, among others. For many of the topics considered, a 'historical' database can now be reconstructed for almost every major town in the country. The significance of this is that technical experts, politicians and even individual citizens can now verify to what extent their own town has improved (or deteriorated) its score in any area (urban greenness, mobility, the water cycle, and so on) - and thus assess how sustainable their urban context actually is overall. So, in answer to your question, while the impact of our report on urban environmental management cannot be readily quantified, we can safely state that it has been and remains huge.

Another environmental awareness-raising activity you mentioned is the so-called Green Train. What is it, and who is it for?

The Green Train is a traveling environmental information, education and surveillance campaign that monitors air quality and noise levels in our cities.

First organized in 1988 in conjunction with Italy's national railway, this campaign travels aboard a special train housing an exhibition on the environment and its protection, the consequences of our daily actions and eco-sustainable lifestyles that can lessen our environmental footprint.

The Green Train is for both children and adults, pupils and teachers, and serves multiple purposes: to monitor air and noise quality by using measuring posts in the

cities it visits; raise awareness among health authorities and agencies entrusted with inhabitants' quality of life, and encourage them to take action; raise awareness among citizens and encourage choices that save energy, make mobility more sustainable and manage waste wisely; provide environmental education pathways for schoolchildren, and create opportunities for debate with governments, citizens and sector operators to consider the necessary technical solutions and mechanisms for change.

During the campaign, the Green Train stops at each city for around five days. Visitors can board the coaches to visit the exhibitions, models, video rooms and lecture rooms. School visits are organized as well, with a program that encourages hands-on contact with many environmental topics and shows schoolchildren and other visitors the small, day-to-day steps they can take to cut pollution and waste.

Environmental education for children and young people is one of your strategic lines. What does the Child Ecosystem contribute within this framework?

The Child Ecosystem is Legambiente's annual dossier on child and youth policies adopted by 108 Italian province capitals. For ten years it focused on compiling a ranking list of top local authorities with regard to their environmental performance, but in recent years the emphasis has shifted to showcasing best practices and highlighting the many successful initiatives addressed to children and young people in our cities. It is an idea repository of proposals made with or for children that compiles both small-scale initiatives and large projects,

A group of students with a Legambiente environmental educator on the Green Train.



A nationwide demonstration to raise citizen and government awareness of how pollution affects the climate.





Children designing their own idea of a city during a 100 Streets to Play event in Milan.

showing that child-oriented policies aimed at the youngest can acknowledge their status as maturing citizens with rights and duties on their way to become conscious and responsible adults.

The Child Ecosystem is our attempt to foster policies for the youngest members of our society; highlight projects and ideas that encourage active citizenship of children; foster synergies and dialogue among educational stakeholders to raise the overall cultural standard of our country, and demonstrate the value of the best practices that encourage socialization, access to culture, access to meeting places and spaces for debate, as well as access to spaces managed by age-peer and non-age-peer users.

Do you have any other environmental awareness-raising and educational initiatives for children?

The 100 Streets to Play campaign is a whole day devoted to cities as spaces to be reclaimed and experienced safely and sustainably, especially by children. The aim is to reclaim urban spaces for kids, turning them into places where they can play and express themselves. Taking its inspiration from the UN Convention on the Rights of the Child, this campaign aims to encourage children's active participation while addressing environmental issues. It began in 1995 and is held at the start of spring. Some streets and squares are closed to traffic and filled with games and performances for little ones, environmental education activities, information points and opportunities for meeting. It is an occasion to enjoy a lovelier city without annoying traffic or smog, but it is also a chance to give the streets and squares back to the citizens, re-imagine public spaces that are more enjoyable for all, and promote and encourage more sustainable mobility that bears in mind the needs of the youngest members of society.

The campaign raises debates on topics related to pollution, traffic, and the environment at large. In several



Young Legambiente civil defense volunteers help recover artworks after the 2009 earthquake that shook L'Aquila.

cases some streets have been permanently closed to traffic and pedestrianized, which is a positive outcome. Every year the campaign is launched with a message promoting sustainable mobility measures such as cycling or walking, and leaving your car at home.

Speaking of sustainable mobility, tell us about the Little Giro of Italy.

The Little Giro of Italy is a joint initiative by Legambiente, Cities on Bikes (*Città in Bici*) and the Italian Federation of Bicycle Lovers (*Federazione Italiana Amici della Bicicletta*). It enables Italian city councils to bring on board local associations that actively promote cycling and walking to facilitate urban cycling for mobility.

During the Little Giro, councils are encouraged to implement measures conducive to more cycling for mobility on that particular day - closing off some streets to traffic, or encouraging students and government workers to cycle through car-control barriers. The aim is



Drawing public and government attention to 'eco-monstrosities' at La Scala dei Turchi in Sicily - one of Italy's prettiest beaches.

to pack the city with as many bikes as possible: the city that manages to get the most people on bicycles that day wins the challenge. Legambiente Circles and FIAB member associations provide support for city councils and monitor the competition.

What should local governments keep in mind in encouraging sustainable development?

Governments should pay attention to three essential conditions for citizens to identify with where they live and contribute to the culture of their own communities. First, public spaces need to be high-quality, well-managed and well cared-for, open to chance meetings and to 'co-constructing' citizenship. They should be designed for accessibility, and fit in within an urban fabric that does not sacrifice enjoyment of place to safety and affluence. In a country such as Italy, this means working for schools to be

beautiful, functional and safe; for squares to be free from the domination of motor traffic; for libraries to be open and lively.

The second condition is participation. This must be established by regularly consulting citizens about the city's decisions on development and change as well as on delicate issues that may arise, including environmental ones. Participation should also be based on listening to the needs and ideas expressed by citizens, paying particular attention to enhancing the identity of new generations.

The third condition is official or even statutory recognition of civil society organizations - associations and volunteer organizations - to acknowledge the horizontal subsidiary role they play in the welfare, cultural wealth and social cohesion of the entire community. ●

Our Urban Environment - Challenges and Opportunities

Jacqueline McGlade

Executive Director of the European Environment Agency

ARTICLE

The global population is concentrating in cities. In Europe, around 75% of the population live in urban areas and this is projected to increase to about 80% by 2020. Our cities and urban areas face many environmental challenges, but the very proximity of people, businesses and services means that there are also huge opportunities. Indeed, well designed, well managed urban settings offer a key opportunity for sustainable living.

For the three-quarters of Europe's population that live in cities and towns, a clean, well-functioning urban environment is a precondition for a good quality of life. Over the past decade, attitudes to living in cities have been changing: people are staying or returning to city centres, reducing residential sprawl in the peri-urban areas.

As the major function of cities is not only to provide places for people to work but once again to live in, urban environments will need to be assessed from a very specific human perspective: to provide an agreeable and healthy place to live while minimising or balancing negative side effects.

Quality of life in cities relies on a range of components such as the quality of the infrastructure, transport networks, access to basic services as well as levels of investment. The environmental elements of a good quality of life include good air quality, low noise levels, clean and sufficient water, good urban design with sufficient and high quality public and green spaces, and a good local climate with opportunities to adapt to climate change.

Air Quality

Air quality in Europe has improved over the past 20 years, but many Europeans are still exposed to air pollution

concentrations exceeding the EU air quality limits.

Ozone (O₃) and particulate matter (PM) are the most problematic pollutants for health, potentially causing or aggravating cardiovascular and lung diseases and leading to premature death.

Twenty per cent of the EU urban population live in areas where the EU air quality limit value for PM₁₀ concentration was exceeded in 2009 (EEA, 2011). However, 80-90 % of the EU urban population was exposed to levels of PM₁₀ which exceeded the more stringent World Health Organisation (WHO) air quality guidelines (WHO, 2006).

Approximately 17 % of European citizens live in areas where the EU ozone target value for protecting human health was exceeded in 2009, but more than 95% of the EU urban population was exposed to ozone exceeding the WHO level.

The forthcoming tables list the most and least polluted cities in Europe in 2009 in terms of PM₁₀ or O₃ exceedance days. The figures are broadly representative of urban residential areas and the majority of the urban population. Notably, for PM₁₀ the worst-case exposure of individuals is in street canyons with intense traffic. The number of exceedances in such areas can be far greater than reported in the urban background areas.

THE 10 MOST POLLUTED CITIES WITH REGARD TO PM₁₀ AND O₃ IN THE URBAN BACKGROUND (2009)

<i>Number of days of PM₁₀ exceedances of EU limit value of 50 ug/m³ (daily mean)</i>	<i>Number of days of O₃ exceedances of EU target value of 120 ug/m³ (maximum daily 8 hours mean)</i>		
Plovdiv, Bulgaria	170	Košice, Slovakia	106
Kraków, Poland	152	Braila, Romania	103
Pleven, Bulgaria	136	Oradea, Romania	85
Stara Zagora, Bulgaria	133	Nitra, Slovakia	84
Sofia, Bulgaria	130	Novara, Italy	83
Nowy Sacz, Poland	129	Brescia, Italy	81
Zabrze, Poland	115	Pécs, Hungary	79
Gorzów Wielkopolski, Poland	108	Bergamo, Italy	79
Monza, Italy	108	Vicenza, Italy	73
Bytom, Poland	107	Cremona, Italy	68

Source: AirBase, 2012.

THE LEAST POLLUTED CITIES WITH REGARD TO PM₁₀ AND O₃ IN THE URBAN BACKGROUND (2009)

<i>Number of days of PM₁₀ exceedances of EU limit value of 50 µg/m³ (daily mean)</i>		<i>Number of days of O₃ exceedances of EU target value of 120 µg/m³ (maximum daily 8 hours mean)</i>	
Braunschweig, Germany	4	Hradec Králové, Czech Republic	0
San Sebastián/Donostia, Spain	4	Ulm, Germany	0
Burgos, Spain	4	Århus, Denmark	0
Castres, France	4	Oviedo, Spain	0
Newcastle upon Tyne, United Kingdom	4	Santander, Spain	0
Warrington, United Kingdom	4	Bilbao, Spain	0
Bremen, Germany	4	San Sebastián/Donostia, Spain	0
Helsinki, Finland	4	Oulu, Finland	0
Alicante/Alacant, Spain	3	Saint Denis, France	0
Mataró, Spain	3	Pointe-a-Pitre, France	0
Marbella, Spain	3	Fort-de-France, France	0
Ajaccio, France	3	Cayenne, France	0
Nice, France	3	Calais, France	0
Oslo, Norway	3	Dublin, Ireland	0
Belfast, United Kingdom	3	Panevežys, Latvia	0
Leicester, United Kingdom	3	Bergen, Norway	0
Southampton, United Kingdom	3	Vila Nova de Famalicão, Portugal	0
Reading, United Kingdom	3	Bacau, Romania	0
Limoges, France	3	Pitesti, Romania	0
Wolfsburg, Germany	2	Baia Mare, Romania	0
Bremerhaven, Germany	2	Ramnicu Valcea, Romania	0
Elche/Elx, Spain	2	Göteborg, Sweden	0
Oulu, Finland	2	Malmö, Sweden	0
Agen, France	2	Norrköping, Sweden	0
Périgueux, France	2	Helsingborg, Sweden	0
Bastia, France	2	Lund, Sweden	0
Aberdeen, United Kingdom	2	Leeds, United Kingdom	0
Rostock, Germany	2	Glasgow, United Kingdom	0
København, Denmark	2	Edinburgh, United Kingdom	0
Palma de Mallorca, Spain	1	Manchester, United Kingdom	0
Stockholm, Sweden	1	Sheffield, United Kingdom	0
Malmö, Sweden	1	Belfast, United Kingdom	0
York, United Kingdom	1	Newcastle upon Tyne, United Kingdom	0
Saint Denis, France	1	Derry, United Kingdom	0
Dublin, Ireland	1	Aberdeen, United Kingdom	0
Genova, Italy	1	Kingston-upon-Hull, United Kingdom	0
Tallinn, Estonia	0	Nottingham, United Kingdom	0
Badajoz, Spain	0	Plymouth, United Kingdom	0
Livorno, Italy	0	Barnsley, United Kingdom	0
Göteborg, Sweden	0	Southampton, United Kingdom	0

Note: The size of table 2 is controlled by the amount of cities with zero exceedances for ozone. / Source: AirBase, 2012.

Traffic is a main source of PM₁₀ emissions together with industry and residential sources. Ozone is the product of chemical reactions between other gases (nitrogen oxides, carbon monoxide and volatile organic

compounds).

To improve air quality many different kinds of policies and measures must be applied at different levels (local, national and international). These include reducing

emissions levels at source, better urban planning to reduce people’s exposure and lifestyle changes at the individual level.

Noise

Noise pollution affects many Europeans. Across Europe, at least 100 million people are exposed to damaging levels of noise just from road traffic. Exposure to noise can cause stress and interfere with basic activities such as sleep, rest and study. But prolonged exposure can also trigger illnesses as serious as hypertension and cardiovascular disease.

The WHO Night Noise Guidelines for Europe (WHO, 2009) describe levels above 55 dB (decibels) L_{night} as ‘increasingly dangerous to public health’. This indicator, L_{night} is the long term average sound level determined over all night periods of a year. While the WHO interim target for L_{night} is 55dB, the actual Night Noise Guideline for Europe is 40dB L_{night} . Figure 1 shows the situation in selected European cities with more than 250,000 inhabitants. In some cities, close to half the population is exposed to 55 dB L_{night} or more.

Road transport is by far the largest noise pollution source, but also rail and air transport can contribute to noise problems in some areas.

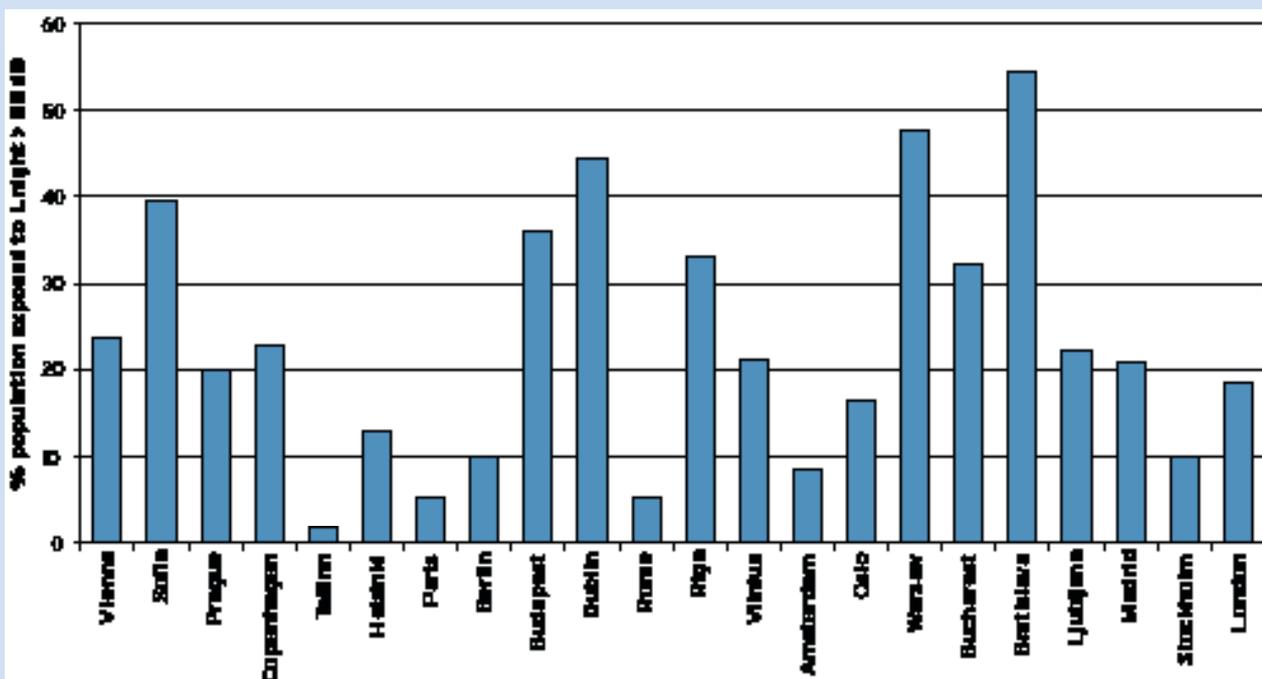
Fortunately, noise levels can be reduced. The winning project of the European Soundscape Award in 2011 is an example of how noise pollution can be tackled in an integrated way.

The Dutch province of Gelderland and the municipality of Wijchen won the award for their sustainable and integrated traffic noise reduction solution in the village of Alverna. The winning project combined a range of innovative measures to reduce noise levels. The measures consisted of:

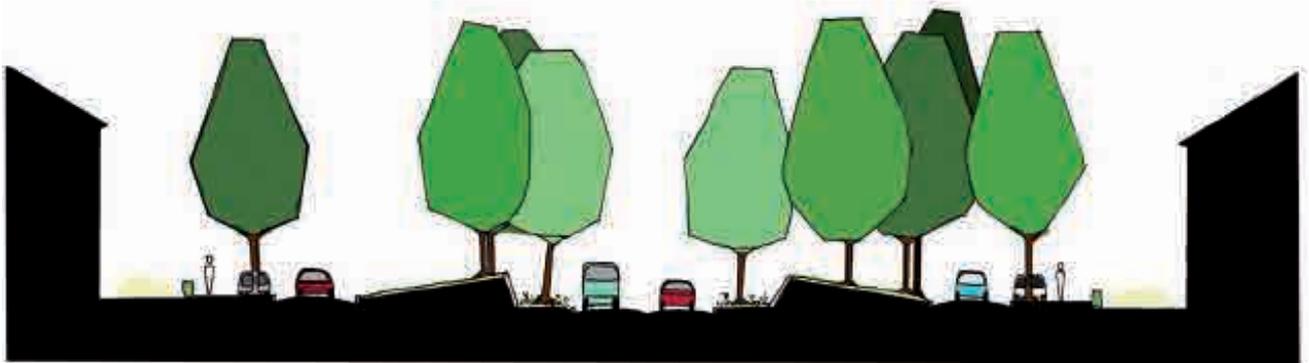
- Moving and reducing the number of traffic lanes
- Sinking the road by 0.5m
- Constructing low-level sound barriers of 1m on each side of the road
- Using special ‘quiet’ asphalt
- Reducing the speed limit from 80 to 50 km/h in Alverna

These measures meant planners were able to achieve the same effect as installing the usual unattractive, 4m-high noise barriers. The project also included a tree planting scheme to create attractive pedestrianised areas. In addition to the noise reduction benefits, the full package of measures also increased road safety, reduced fuel use, and helped improve air quality and quality of life in the village.

PERCENTAGE OF PEOPLE EXPOSED TO LEVELS ABOVE WHO INTERIM TARGET FOR NIGHT-TIME NOISE IN EUROPE FROM ROAD TRANSPORT (>55 dB L_{night})



THE FINAL DESIGN OF THE GRAAFSEWEG IN ALVERNA IS THE RESULT OF A CAREFULLY COORDINATED, INTERACTIVE PROCESS BETWEEN THE PROVINCE, THE MUNICIPALITY AND THE RESIDENTS AND BUSINESSES IN THE VILLAGE



Water

A sufficient supply of good quality water for drinking and other uses is vital for cities. Average water use varies among European cities ranging from 150-400 l/person/day. In the past, with growing populations and increasing demand for water, European cities generally relied on the surrounding regions to provide their water. Athens, Istanbul and Paris, for example, have all developed wide-reaching networks and infrastructures for transporting water, often over more than 100-200 km.

SUFFICIENT WATER FOR ANKARA, TURKEY?

In Ankara, intensive drought conditions occur at least once in each eight-year period, the last being in 2007. Although such events are natural, the situation of Ankara has changed dramatically: from a small town with some 74 000 inhabitants in 1927 it had become a metropolis of more than 3 million by 2000, expanding its area over the years more than 650-fold. This growth is expected to continue, and water consumption per person is also expected to increase as a result of changing lifestyles and economic activities. However, the water resources are limited and insufficient to meet current demand. Climate change, with an expected decrease of annual precipitation and river flows in the region, is projected to further aggravate the situation and make a drought management plan a priority.

Source: Ceylan, 2009.

Urban Design and Green Urban Areas

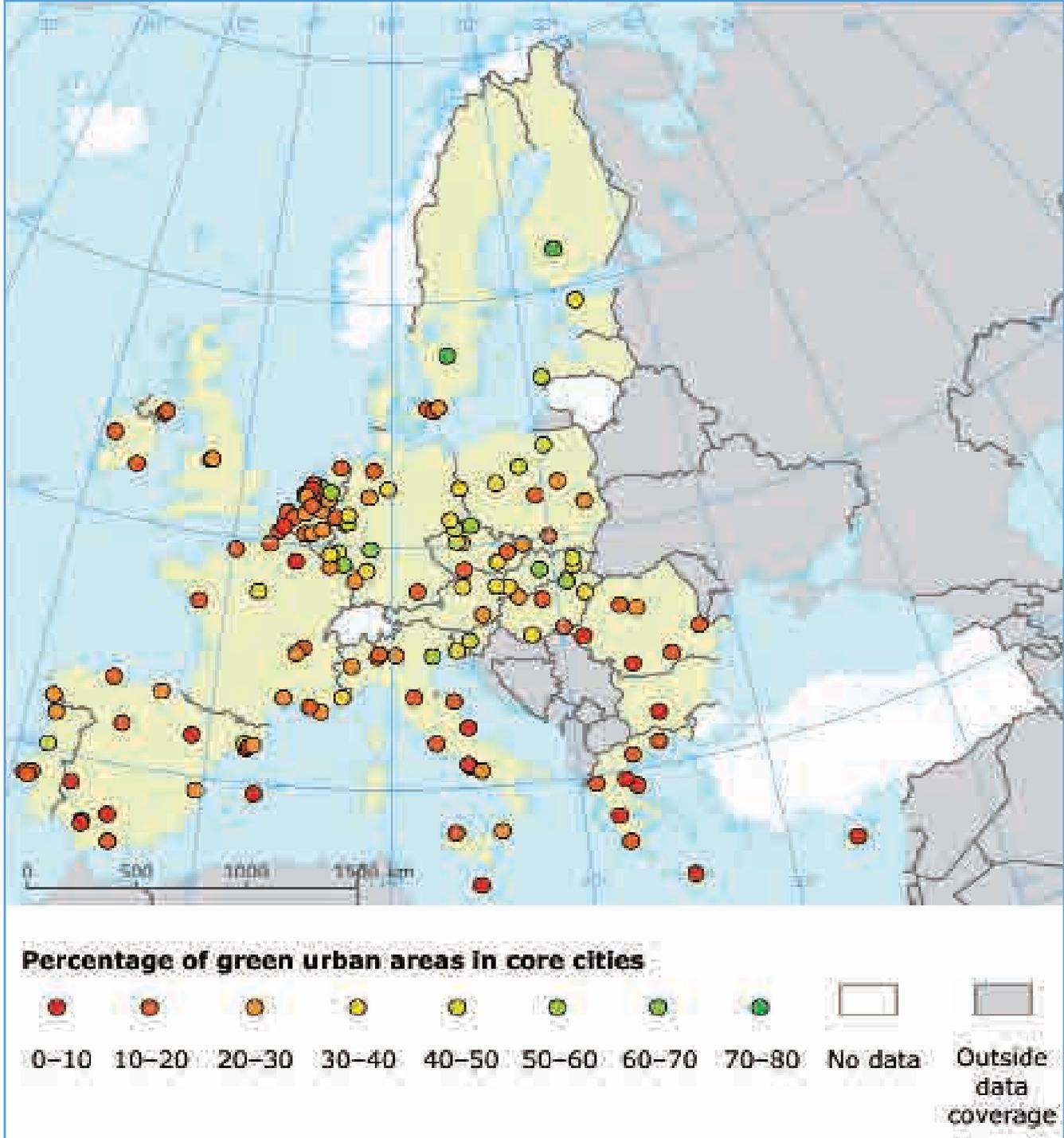
Urban design sets the physical framework for a city's functionality. An appropriate urban design can provide people with opportunities to choose more sustainable and healthier life styles as well as to modify the impacts of environmental pressures.

Incorporating green infrastructure in cities can help cities adapt to climate change by regulating local temperatures. More green urban areas reduce the level of soil sealing – the covering of soil for housing, roads and parking lots and so on – and therefore also reduce the absorption of energy from the sun preventing higher urban temperatures (the so-called 'urban heat island effect'). The city of Zaragoza in Spain is one example of this principle. Here temperatures differ across the city with green urban areas notably cooler than high-density ones (Cuadrat-Prats et al., 2005). More green areas will also increase natural drainage and prevent water run-off, which during heavy rains can lead to urban floods.

Other benefits include improved air quality and noise conditions as dense shrub and tree plantings can filter particles and create quiet areas. Green areas can also support biodiversity depending on their quality, number, size and distribution. Last but not least, giving urban residents the opportunity and the possibility to enjoy greater access to green areas and to reconnect with nature also has multiple benefits for mental and physical health.

This map shows the share of green urban areas in cities varies across Europe. A lower proportion of public green areas is more common in southern and western European cities.

SHARE OF GREEN URBAN AREAS IN EUROPEAN CITIES (2006)



Urban planners who are aware of the opportunities associated with 'city living' in terms of sustainability and resource use, are promoting smart urban designs to reduce overall transport demand – the length and number of trips – and promote more sustainable transport modes

such as walking, cycling and public transport (see EEA, 2010a).

Intelligent building design and urban density can also help reduce energy demand as multi-storey houses need less energy for heating and cooling per living area due

to a lower proportion of outside walls and roof area than single family houses (JRC, 2008).

Land demand can also be reduced within and outside the city through attractive urban design, encouraging people to live within the city limits (see EEA, 2010b).

If these opportunities are fully exploited urban dwellers will consume much less energy and land per capita than rural residents.

Designing the Future

Cities are ecosystems: they are open and dynamic systems and have their own metabolism which consumes, transforms and releases materials and energy; cities can be designed in such a way as to make them adaptable to changes in climate and flexible to demographic change; they are shaped by humans and interact with other ecosystems and must therefore be managed like any other type of ecosystem.

Through rethinking urban design, architecture, transport and planning, we can turn our cities and urban landscapes into resource-efficient 'urban ecosystems' at the forefront of climate change mitigation employing ideas of sustainable transport, clean energy and low consumption, and also adapting to climate change. This

could include floating houses and vertical gardens on building walls. Furthermore, better urban planning will improve quality of life across the board by designing quiet, safe, clean and green urban space. It also creates new employment opportunities by enhancing the market for new technologies and green architecture.

Cities, due to their concentration of people and activities, are extremely important for Europe. Some problems can be solved at the local level or even at the individual level. For example, people living in cities need to make the right choices with the transport they use, the energy they consume and the products they buy. Local authorities can support lifestyle changes with a strategy for promoting active citizenship. However, to fully tackle the environmental challenges faced by cities, better policy integration and new forms of governance involving many more parts of society will be needed. This means a far closer partnership and coordination at the local, regional, national and European levels.

For More Information

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Water Park © City of Zaragoza



Coming Back to Rio: Lessons from Two Decades of Local Sustainability

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ARTICLE

Local Agenda 21, initiated by ICLEI - Local Governments for Sustainability,¹ has inspired thousands of local governments and communities worldwide to put in place local strategies and actions for sustainable development. This article presents key points from the “Local Sustainability 2012: Taking Stock and Moving Forward” review,² undertaken by ICLEI in preparation to the Rio+20 Conference, to capture the changing role of local governments in the last two decades of global action for sustainable development.

On June 20-22, 2012 global leaders have met in Rio de Janeiro, Brazil for the United Nations Conference on Sustainable Development, known as Rio+20. UN Secretary General Ban Ki-moon announced it as “one of the most important meetings in UN history”, crucial for determining our collective future.³ With urban areas being home to 50% of the world’s population and accounting for 75% of carbon emissions, it is becoming increasingly clear that it is in cities that this future will be shaped.⁴

Local Agenda 21: Birth of a Global Movement

The name “Rio+20” refers to the 20th anniversary of the UN Conference on Environment and Development, better known as the Earth Summit, that ended, among others, with the adoption of Agenda 21, the UN program of action for implementing sustainable development. This document contained a chapter entitled “Local Authorities’ Initiatives in Support of Agenda 21” (Chapter 28) which gave birth to the global Local Agenda 21 movement. In the words of Maurice Strong, the Secretary-General of the 1992 Earth Summit, “of the many programs that have resulted from the Earth Summit, none is more promising or important than this one, which has hundreds of local authorities around the world now setting out and implementing their Local Agenda 21s.”⁵

Chapter 28 not only acknowledged the importance of local action for achieving sustainable development on the global level but also recognized the unique position of local governments as educators and multipliers, concluding that:

“As the level of governance closest to the people, [local authorities] play a vital role in educating, mobilizing and responding to the public to promote sustainable development.” Chapter 28, Agenda 21 (1992).

Local Agenda 21 has been a call to action, not a set of rules to follow. Thousands of cities from all over the world responded to this call, entering into a dialogue with their communities and local stakeholders, together developing local strategies to achieve sustainable development. Even though global sustainability remains a distant goal, it is clear that local initiatives have profoundly changed the way we think about sustainable development, making

a lasting mark not only on local but also on national and international governance systems, and pushing the boundaries of what is achievable.

From Rio to Johannesburg

Twice in the past ICLEI has undertaken an attempt to analyze Local Agenda 21 progress on a global scale. In 1997 the first assessment⁶ was conducted, to inform the UN General Assembly Special Session tasked with a five-year review of Agenda 21. For the purpose of this first assessment, ICLEI had adopted the following, working definition of the Local Agenda 21 process:

“Local Agenda 21 is a participatory, multi-sectoral process to achieve the goals of Agenda 21 at the local level through the preparation and implementation of a long-term, strategic action plan that addresses priority local sustainable development concerns.”

According to the survey, in 1997 Local Agenda 21 activities were underway in more than 1800 local governments, in 64 countries. Over 80% of the reported activities were taking place in 20 countries with established or just starting national Local Agenda 21 campaigns. A staggering 90% of initiatives were taking place in high-income countries. On the other hand, those underway in middle- and low-income countries were less focused on environmental issues but aimed at a better integration of environmental, social and economic issues, even if they included a shorter time perspective than those in high-income countries.

In spite of the fact that at that time a majority of the local governments surveyed were still in the early stages of Local Agenda 21 planning, the mere decision to engage in these processes has already set in motion the changes in the local governance structure, in order to gradually allow for integrating key requirements of sustainable development into local planning and budgeting. The report concluded that:

“the implementation of the Local Agenda 21 process requires local governments to decentralize governance, reform their current departmental structures, and change traditional operational procedures. As a result, these local governments are becoming more open, more participatory,

and more dedicated agents of the sustainable development agenda."

Five years after the Rio+5 assessment, ICLEI repeated the exercise,⁷ previous to the 2002 UN World Summit for Sustainable Development in Johannesburg, South Africa. The report identified over 6400 local governments in 113 countries worldwide that were engaged in Local Agenda 21 activities, a greater than three-fold increase over less than 5 years. Even though more than 80% of these local governments were located in Europe, a significant increase has been noted in the number of countries in which one or more Local Agenda 21 processes were underway.

Understanding Local Sustainability Today

To capture the changing role of local governments in the last two decades of global action for sustainable development and propose recommendations for the future, ICLEI has undertaken a global review. Entitled *Local Sustainability 2012: Taking Stock and Moving Forward*, the report draws on the knowledge and experience of people supporting local sustainability processes, representing ICLEI and UN-HABITAT offices worldwide, as well as civil society and academic partners.

A growing variety and complexity of local sustainability processes, as well as their progressive integration into the municipal systems, means that it is now increasingly difficult to study them from an international perspective using quantitative instruments. Instead, 20 years after the adoption of Agenda 21, we want to know more about the dynamics and impact of these processes, institutions and mechanisms that emerged and the political and social changes to which they contributed.

Another difficulty is related to the fact that, even though many cities work on sustainable development issues, not all use the term "Local Agenda 21". Some have never used it in the first place (e.g. the United States or Finland) but many have replaced it with a new term, better suited to local conditions and challenges, such as Local Sustainability Plans, Sustainable Community Strategies or even Local Green Growth Plans, as is the case in South Korea. This gradual move away from the original "Local Agenda 21" label in many places has to be seen as an indication that local sustainability has become an established policy area, and thus increasingly uses local political language instead of the original UN jargon.

Fortunately, in stark contrast to the term that symbolized its beginnings, the local sustainability movement is growing fast, spanning thousands of cities across all continents. It has long entered the mainstream, becoming a part of everyday routine for local governments worldwide. More and more cities, asked about their commitment to sustainable development, answer that it is becoming a cross-cutting issue, a guiding principle applied

to all their activities. This is also reflected in the growing number of organisations and international processes that regard the local level as key to achieving sustainable development.

The variety of local sustainability processes that have developed in countries and continents all over the world is striking. ICLEI's review focuses on the main driving forces behind local processes and identifies five key types of local sustainability processes. By discussing the strengths and weaknesses of each type, the report adds to the global debates on the need for a new, multi-level governance framework. According to the typology presented in the review, a local sustainability process can find its way into a city in the form of:

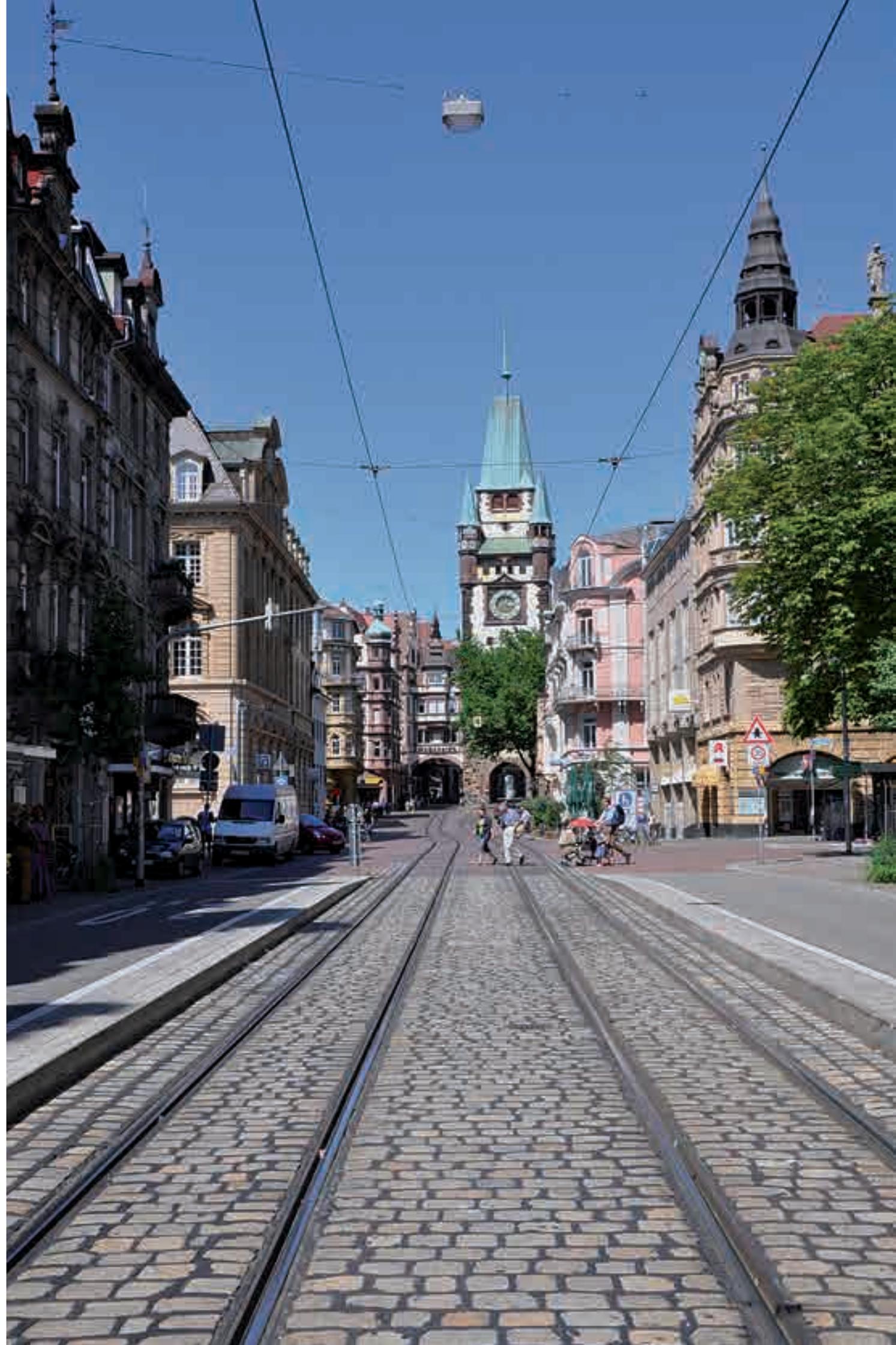
1. Local Strategy
2. Civil Society Initiative
3. Concerted Action
4. National Policy
5. International Cooperation

It has been widely acknowledged that, in order to advance sustainable development on a global scale, a multi-level effort is needed. However, the real question is how the different levels of governance can work together to make the most of their individual strengths while mutually supporting each other. Although most local processes include elements of more than one of the types listed above, singling out the key driving force can offer a more in-depth understanding of characteristics, strengths and weaknesses inherent in a certain type of process. In addition, tracking the development of each type over time gives a valuable insight into typical problems faced by different processes, depending on how were they initiated.

Sustainable Cities, Sustainable Communities

The enhanced culture of public participation is often quoted as one of the most remarkable achievements of the local sustainability processes worldwide. For many decision makers and citizens alike, this shift in governance is itself regarded as a major step towards more sustainable cities and towns. Considering that the success of local sustainability depends also on the radical change of individual lifestyles, a trust-based dialogue between various groups that make up the local community may well be one of the critical resources needed to make that change happen.

History of public participation in Latin American and African municipalities shows us that such a dialogue is not only building trust but also contributes to an awareness of shared responsibility for development. In consequence, people are more likely to pay fees for municipal services,





The seeds of local action sown in 1992. © David Swart

which translates into increased revenues for the local government and, through further investments, into improved quality of life for the inhabitants. Kaladougu in Mali, a city that has worked on improving its communication with citizens in partnership with the Canadian City of Moncton, has managed to increase its revenue stream by 25% in less than six months.⁸

In many countries it was the local governments, as *“the level of governance closest to the people”* to quote chapter 28 of Agenda 21, who voluntarily initiated and developed the practice of public participation, often investing considerable staff and financial resources in preparing and facilitating these processes. By doing that local governments have contributed greatly to the education and empowerment of citizens, not only in the field of sustainable development.

The development of new technologies has had a great impact on participation processes, making it easier for people to express their opinions. Growing access to internet has made it possible to reach out to new social groups, decreased costs of participation processes (e.g. by using online communities instead of face-to-face meetings) and enabled more individual interaction between citizens and city officials (e.g. via social media). With new applications appearing almost every day and the spread of mobile phones, also in developing countries, the potential of using these technologies to accelerate local sustainability is immense. More importantly, online technologies create new ways of engagement that redefine local public participation, pushing it towards collective co-production of knowledge and services.⁹

Even though the right to public participation in sustainable development may seem obvious today, it was only in 1998 that the UNECE Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters¹⁰

was signed, entering into force three years later. As of November 2011, it has been signed by 45 parties and has played such an instrumental role in encouraging greater transparency in environmental matters that its extension to a global level was one of the expectations formulated towards the Rio+20 Conference.

Where Do We Go Next?

Local governments have shown that they are able to drive the implementation of sustainable development and to initiate respective local processes - sometimes much more effectively than national governments or international organisations. Sustainable development has been successfully localised and is no longer a distant, theoretical concept but one filled with meaning and evoked in everyday activities.

The Local Sustainability 2012 report acknowledges that much more needs to be done in order to escape the impending environmental and social crisis and ensure well-being for all within the limits of planetary resources. Amongst others, the following conclusions and recommendations form the essence of the review:

- **Local consciousness about global and future impacts of today's action has never been as high.** However, in order to fully exploit this awareness, information on global trends and the impacts of any local activity on future generations and other places must be made available as a standard basis for political and economic decision-making.
- **A good local sustainability process uses various driving forces.** One of the key lessons learned from the review is that the effectiveness of local sustainability processes as well as of programmes designed to support them could be enhanced by combining the strengths of the five process types identified.
- **Local sustainability processes are hubs of social innovation.** By combining classic methods of consultation



Have now bloomed into thousands of initiatives worldwide. © Tony Spencer



City of Rio de Janeiro, Brazil - the birthplace of Local Agenda 21. © Alcindo Correa Filho

and participatory policy development with new forms of spontaneous and collective action, local sustainability processes can strengthen their role as testbeds of sustainable innovation.

- **Greening the economy is a chance to address the crisis.** However, for the green economy to become a serious contribution to sustainable development, it has to be linked with social -not only technological- innovation.

Decentralised solutions and public control over common goods will be key.

- **Sustainable development needs a multilevel governance system with a multi-sectoral approach.** Any global governance framework for sustainable development should include local governments as equal, governmental partners and at the same time initiate national and international legislation that supports their efforts. ●

1. Founded in 1990, ICLEI is today the largest international association of local governments for sustainable development. Membership is constantly growing and at the end of 2011 included over 1200 local governments, coming from 70 different countries and representing almost 570 million people, who have made a commitment to sustainable development. For more information visit www.iclei.org.

2. A full version of the study, together with the accompanying case study collection, is available at local2012.iclei.org.

3. "Failure to invest in young people 'a false economy,' Secretary-General tells General Assembly High-Level Meeting on Youth," SG/SM/13719, 25 July 2011.

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10. <http://www.unece.org/env/pp/welcome.html>

The Role of Local Citizenship in Battling Climate Change

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The major agreements addressing the issue of climate change form part of a world-wide political agenda. This difficult task consists of reversing the ecological imbalances and, at the same time, promoting sustainable development throughout the planet. While those agreements are being made at a global level, the responses to them are in the hands of those operating at a local level. Experiencing climate change on a social and individual level is an important learning process. Turning around the current ecological imbalances requires institutional changes that allow us to take on these new goals and challenges. Thanks to groundbreaking initiatives, the application of imaginative tools, and the development of ambitious policies in various cities throughout the world, we now find ourselves at this turning point that can allow us to fulfill our global objectives.

Twenty Years is Nothing: Rio+20

Life expectancy today is greater than it has ever been for any previous generation, and is a reflection of the level of development of modern society. Nonetheless, for the first time, the prospects facing future generations are not expected to be better than what their parents experienced. This is the issue facing the UN Secretary-General's High-level Panel, and has been the focus of the Rio+20 summit meeting.

It is very worrisome to witness the contrast in a highly developed society that is, nonetheless, stressing life-sustaining ecosystems to their limits. The preliminary report for the Rio+20 summit aims to address this enormous challenge.

While an unprecedented level of prosperity and wellbeing has been achieved in today's world, this development is based on the massive use of limited energy resources that affects the fragile ecosystems, including the most sensitive of all: the climate. The challenge we face includes an element rooted in our cultural, ethical and political identity: the commitment to maintaining equity for future generations.

The efforts made by previous generations led to a better life for those that followed. Rio+20 has aimed to make this same commitment to future generations, by working to preserve environmental balances on our planet.

Norway is an example of this: instead of investing the resources drawn from their oilfields to serve today's generations, they have designed an investment strategy to assure high standards of living for upcoming generations (for example, developing an innovative hydraulic transmission wind turbine system). Ecuador, a country with very different characteristics, serves as an excellent example in terms of how it developed a plan – with the support of the UN Development Program – to avoid exploiting oil resources and to preserve the bio-diverse area of Yasuní for generations to come.

Nonetheless, the response to this enormous goal and challenge facing us will require both the achieved development and a clear focus on the problem. There have always been two sides to innovative scientific research and technological development. On one hand they have made decisive contributions to well-being and prosperity but, on the other hand, that development has caused collateral damage: external environmental and social factors that call for a reassessment of a unilateral concept of progress.

Strategies to reduce the impact of climate change require a new focus in terms of public policies. It is on an institutional, not a technological level, where a new approach to managing 21st-century environmental questions is needed. Climate change must be battled using inclusive strategies in order to address a shared problem that goes beyond personal, local and national interests at the same time that opportunities are arising, which demand cooperation and mutual interdependence.

The Climate Challenge in the Cities

The City of Munich proposed supplying electricity from renewable energy sources to all households in that municipality as of 2015. Doing this required a significant amount of wind energy. However, the regional government of Bavaria's territorial protection policy put hurdles in the way, making this goal impossible. Instead of giving up, Munich decided to adopt much more imaginative ways to achieve greater energy efficiency, in a clear decision to opt for diversified renewable energy resources.

The IPCC's (Intergovernmental Panel on Climate Change) special report on renewable energy sources and climate change mitigation sets the goal of 2050, for 80% of the world's energy supply to be met by primary renewable sources. The role of cities is key in achieving that aim.

Continuing with the example of Munich, its Mayor Christian Ude, has proposed reaching the goal of 100% renewable energy by 2025.

The path that Munich has embarked upon is not unlike that chosen by many other cities, which is an optimistic sign. Munich generates 2.4 million kWh through renewable sources, supplying electricity to 250,000 households and covering the electrical needs to operate the tram and underground transportation system. This plan includes solar energy, small hydropower, geothermal energy, biogas and wind energy. The aim is to provide a full 7.5 million kWh supply of renewable energy to the city by 2025.

Many other cities are following in the same footsteps and each deserves special mention, but this brief article does not allow for even a partial listing of them. All of these cities are working to reduce carbon emissions through a change of behavior and habits on the part of the population, which requires educating citizens to raise their awareness on the new goals and challenges we face.

Reviving Local Energy Management

The need to establish aims shared by public institutions, businesses, research centers and citizens requires putting social dynamics into action which, historically, are reflected through generational differences. In this regard, technological change plays an important role. Speeding up this change requires a political commitment above and beyond that of the institutions; here is where "local citizenship" is key.

The revival of local energy management using renewable resources is not feasible without citizen cooperation. City councils cannot act alone in supporting renewable energy; they should promote the necessary sense of freedom, trust and security to allow citizens to join in the effort. How do we make that happen? One good means is through local grids that operate on the basis of "citizen value" rather than "shareholder value." In the case of Munich, the Stadtwerke Münschen (SWM) company was able, in a matter of just a few years, to supply 30% of the city's energy needs through renewable sources. The 20th century energy model based on cheap and abundant energy is not suitable for the first decade of the 21st century, where there is a heightened sensitivity to climate protection and the technologies exist to make more efficient use of energy.

Encouraging "Local Citizenship"

"Global Citizenship" on climate change is now facing a tough competitor: "Local Citizenship." There are large cities such as Munich, small towns such as Schönau or Schlöben, and medium-sized cities such as Erfurt, where citizens take an active part in generating renewable energy to meet their needs. This is a model for the future, as stated by Hans Peter Perschke, the Mayor of Schlöben.

Schönau is a small town with a population of 2,500 that chose to commit to renewable energy sources. In 1999 it managed to put local energy management in the hands of a 650-member cooperative: Elektrizitätswerke Schönau (EWS), that generates electricity through solar panels, with the additional support of a small hydropower network and wind turbines, allowing them to sell energy to 100,000 clients. Their goal is to reach one million clients and supply 400 million kWh by 2025.

Thus, the battle against climate change turns into an opportunity when it opens the door to the creation of new options involving active citizen participation. Stadtwerke Münschen is participating with a €1.3 billion investment in the construction of offshore wind farms, comprising 80 wind turbines in the North Sea. This same company is also involved in the 50MW Andasol 3 solar thermal power plant project in Spain, that generates 165 million kWh, with an 8-hour thermal storage capacity.

According to calculations, 40% of greenhouse gas emissions are from residential energy use. In 2011 Italy was a leader in the installation of solar panels with the capacity to generate 9 GW of photovoltaic energy; Germany was close behind with a 7.5 GW capacity, followed by China and the United States. Self-consumption regulations as established in the EU Renewable Energy Directive encourage their inclusion in the residential sector. How successfully this will be depends on how

Hydro power plant Isar 1. Source: SWM



society views, understands and manages these goals and challenges, making small changes that promote citizen commitment. It is important that the climate change matter be understood on an individual level and form part of our personal experience and psychological perception. In this regard, both raising social awareness of the issue and providing an economic incentive become powerful levers for change.

Smart Grids

It is not enough, however, to redirect the goals and aims; the instrument or model must be adapted to the new sensitivity to climate change.

It would be good to learn from past successes and mistakes. Roosevelt's New Deal placed emphasis on large hydroelectric projects and coal-fired steam plants, and the various million farms that had their own wind turbines stopped running them when they were forced to connect to the grids that were put in place. Today we are having to retrace our steps. The development of new technologies and the liberalization of the energy sector allow any individual to enter the market and generate his or her own electricity independently of the companies.

Technological development has opened the way to putting the "grid parity" concept into effect. Laws exist which allow for direct on-site use of the generated electricity. There are two advantages to this: firstly, the

power is used where it is generated, thus avoiding the need for transmission and resulting energy losses; and secondly, it avoids grid overloads with renewable energy sources that are difficult to manage. Reversible meters allow for surplus electricity production to be credited against surplus energy consumption, thus achieving a net balance of energy used.

We are still a long way from knowing exactly what rules and norms to apply to regulate a low-carbon power system. There is no one single solution, but rather a range of possibilities that address global cultural diversity. We have systems with vertical integration structures and horizontal separation of activities, energy generation, distribution and sales which we most likely need to adjust. There is a move towards following Germany's and Spain's successful application of a Feed-in Tariff for renewable energy. The model of Independent Transmission System Operator applied by Red Eléctrica de España has served as a point of reference for other countries.

The technology also exists so that the smart system operating the generation of electricity can be used by a consumer who also plays the role of power generator. The great challenge for smart cities or for the Smart Grid (a power distribution network that uses digital technology), requires a change of approach to urban management of energy, waste and water, and a change of habits on the part of citizens.

New Cost Assessments

The bridging technologies for renewable energy sources must be developed together with strategies that contribute to savings and energy efficiency, with an eye towards global costs. As it stands, an erroneous initial cost estimate rewards the suboptimal option.

Let us imagine a region that generally covers its energy needs through conventional power plants. The per capita cost of energy, in Germany is €2,500 per year, including electricity and gas, plus city services (underground transport, tram, street lighting, etc.). A changeover to an energy supply based on local renewable resources would offer a return of €2.5 billion to an area or city of one million inhabitants. This equates to an economic stimulus program that no local government would be able to finance at no additional cost to the taxpayer.

Local governments must have a short-term road map with long-term goals. The Roadmap 2050 sets out strategic goals to avoid making the wrong choices. How much does it cost to reduce a ton of CO₂ using photovoltaic solar panels or wind turbines as compared to an efficient gas power plant? If we look strictly at the kWh cost, it is more expensive to do that through renewable energy. Nonetheless, we overlook the fact that within the next twenty years these plants will continue to have increasing fuel expenses at the same time that





Photovoltaic roof system. Tramway main garage Ständlerstraße.
Source: SWM

Photovoltaic facade system. Pasinger Fabrik. Source: SWM

Hydro power plant Praterkraftwerk. Source: SWM/Green City Energy GmbH

the commitment to CO₂ reduction is steadily growing. We can avoid mistakes today by aiming now for the goal of a decarbonized economy in the year 2050 with an 80-85% carbon reduction.

“Slow energy”

If we support the idea of better eating habits through the concept of “Slow Food” and a more relaxed lifestyle through “Slow Cities,” why not also put our efforts behind “Slow Energy?”

That would be a step towards local innovation and progress, offering a high quality of life and prosperity. One hundred years ago, social reformer Friedrich Wilhelm Raiffeisen stated, “A community can accomplish what one individual cannot do alone.” The new role of cities is to use joint intelligence as a lever for a quick changeover to renewable energy.

The first step is to adapt the conventional electrical supply to the distribution of locally generated renewable energies. We can think in terms of the need to rely on “power volumes” available according to demand, through tendering or contracts. The smart grids can guarantee a safe supply of power through efficient management, providing signals that cover the whole system. This means applying highly efficient technologies and putting an end to a type of energy consumption that, until now, has been blind to the climate change effects.

Most City Councils now apply the idea of “green contracting.” One step further would take them to developing carbon budgeting, which would mean directing a significant portion of supply to low-carbon services and businesses. The product or corporate carbon footprint (supported by ISO 14,064 and 14,067) opens the way to taking climate protection into account when local decisions are made.

This brief article does not allow for a full listing of all of the actions that can be carried in the urban environment. Nonetheless, we must note that there are three key factors that play a role in reduced CO₂ emissions: savings - using low-carbon products and services and changing the diet, as it were; energy efficiency - reducing the energy effect on the economy; and the development of renewable energy sources. Still to be addressed are the “soft policies,” that is, the small efforts that result in important cultural changes. The biggest hurdles to this change are rooted in mistaken concepts.

Active Citizens

Many citizens who wish to join the battle against climate change become discouraged when they run into legal obstacles and an overly rigid market.

The United Kingdom came up with the Pay As You Save concept, whereby the user repays the loans taken to invest in energy efficiency systems with the profits or

savings gained through their use. One part of the net savings goes towards financing the initial investment and the other part is direct net savings. Cities can save on street lighting without additional cost, when a third party makes an investment in products paid off by the resulting savings. This is a role that energy companies can play to further support the battle against climate change.

Funds exist that offer financing at 0% interest; the European Investment Bank is a case in point, through the "Covenant of Mayors Committed to Local Sustainable Energy." The auctioning of carbon emission permits provides another source of financing.

Individuals can also use their resources to finance projects through Eco-Fund grants. Nüremberg's UmweltBank, for example, offers its clients convertible bonds for a €1,000 minimum investment at a 7% nominal interest rate, that is invested in onshore wind energy, photovoltaic energy, etc. This then helps Elektrizitätswerke Schönau (EWS) finance its projects.

Hundreds of families in Birmingham, Sutton, Stroud and Sunderland participate in projects whereby they use and produce efficient solar energy in their homes. This is an "energy revolution" building from the ground up, starting at the citizen and local municipal level. The funds are

provided by a power company which shares profits among the participating individuals.

There are many ways to encourage a change of habits among people. In the United States, for example, electric bills provide information on average energy consumption in that particular area, which encourages people to understand how they can play a personal part in improving the situation. Schönau began its efforts in this regard with an energy-savings contest among its citizens.

The biggest challenge is figuring out how to fit all of the pieces of this puzzle together, that must take into account all of the governing elements. The Rio+20 summit has been an opportunity to identify the most important psychological and cultural hurdles. In any case, the first steps have been taken in forging that path. ●

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Eco-intelligent Cities: Towards a Green Urban Economy

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The world is facing a precarious situation in the next few decades, with the growing population and dwindling eco-capacity of the planet. Cities are at the center of this crisis. They are the main cause of the problem, and they will be the main victim if the ecosystem collapses. But they are also our best hope for overcoming the crisis. To avoid the looming environmental disaster, cities will have to develop a Green Urban Economy. This will be possible only if the local academic institutions provide leadership by assuming the role of advocates and demonstrators of sustainable and resilient urban development. Such cities will be in the vanguard of 'eco-intelligent' cities, showing the way to a safer future to the whole world.

Introduction

The world is facing a complex, troubling and ultimately dangerous situation. Presently, the seven - and soon eight - billion human inhabitants of the planet have ever rising aspirations for a good life. At the same time the natural support systems - including the global climate system, the soil, and the fisheries - are showing signs of stress. We can now clearly see the risky scenario ahead: massive shortages of food, water, energy, sanitation and other basics of life. If both massive and prolonged, these shortages will inevitably lead to economic crises, migrations, social unrest, regional conflicts and a general destabilisation of the global security system.

There are various ways to look at the root causes of these dangerous trends. Some see the problem in the type and scale of technology at human disposal. Others blame the population explosion. Yet others point finger at the capitalist economic system, arguing that it is based on greed and the illusion of eternal growth. Each theory has a merit. And probably only all of them together offer the full explanation on how humanity got itself on the current suicidal path.

By the same logic, a 'comprehensive global solution' would also comprise elements of all of the mentioned theories. A rather broad array of political, legal, economic, demographic, cultural, behavioural and technological prescriptions would be needed if we are to arrive at an effective recommendation of what needs to change, and how to enact that change.

In the light of the central interest of IAEC - cities and education - and the main theme of the 12th International Congress held in Changwon - "Green Environment, Creative Education" - it seems only natural to focus on the role of cities in the looming global environmental crisis. It is indeed the purpose of this paper to show that cities are the principal cause of the crisis, but also that they are our greatest hope too. Cities are the biggest ever concentration of human intelligence, creativity and knowledge, and they contain an enormous amount of educational infrastructure.

Clearly then, cities are better positioned than any other form of human community to teach us how to live more responsibly on this small planet.

The Global Urban Agenda: Sustainability & Resilience

As of a few years ago, we have been regularly reminded by UN statisticians and officials that we live in a predominantly urban world. For the first time in history more people live in cities and towns than in rural areas. This milestone has mostly been used to highlight what was already a significant trend in the latter half of the 20th century: that most important political and economic decisions take place in cities; that most of the global GDP is generated in cities and towns, and that most cultural production and influence come from cities.

The new - urban - condition of the planet has even more often been used to direct attention at the mounting problems of cities: poverty, unemployment, crime, lack of sanitation, homelessness and so on. Urbanisation was thus placed alongside other great contemporary trends - such as globalization, population explosion, peak oil - as one of the defining characteristics of the world in the 21st century, but was also seen as one with many negative connotations.

It was relatively recently (perhaps a decade ago) that cities emerged as a top concern on the global environmental agenda. Ever since climate change/global warming had been linked to the rising human contribution to the greenhouse gases (GHG), it became obvious that most GHG emissions are from cities. Most fossil fuel combustion has to do with generating electricity for urban areas and with powering vehicles for commercial and personal transport. But GHGs are not the whole story. Cities are also responsible for enormous consumption of clean water; destroying soil and habitat due to their spatial expansion; generating mountains of solid and liquid waste; altering microclimate (urban heat island effect), and so on.



The newly built segments of the Eco-city Masdar in Abu Dhabi, UAE, and the suburb of Dharavi in Mumbai, India.

It has now been established, and more or less agreed, that with respect to the global shortage of some resources, and to the climate and other adverse changes in nature, cities:

- a) are the main culprit;
- b) are the main likely victim of future shortages and disturbances;
- c) could nevertheless be the main solution - if we decide in time to avoid the global calamity.

In other words, cities are the main aggregate consumer of natural resources and generator of waste and pollution; cities contain most of the population, often at very exposed (vulnerable) sites; and, cities are best resourced to find and implement solutions - they have most people with knowledge and ideas; most physical resources; enough money; and most political power.

This very important realization of the triple role of cities in the 21st century - as the culprit, as the victim, and as the potential solution - has put cities on the top of the global political and security agenda.

At the same time as cities and urbanization have been climbing the global agenda, another big agenda has been gelling at the global level: UN, UNEP, UNDP, OECD, G-20 and other international organisations have been trying to come up with a prescription for a reform of the global economic system. These efforts are still far from a binding international political agreement. But at least conceptually, they seem to be converging towards a consensus that the new, planet-friendly economy is the Green Economy. This concept, largely based on the idea of ecologically realistic pricing of all natural resources, taxing of all emissions and aggressive deployment of clean technology, is most loudly promoted by UNEP and IUCN.

Assuming these two trends - the focus on urbanization and singling out cities as both the problem and the solution, and the search for the new economic development paradigm - are indeed the dominant duo in the global environmental discourse, we may conclude that the next big trend will be an Urban Green Economy (or, a Green Urban Economy, as would seem to be an equally logical sequence of words).

To understand how that Urban Green Economy agenda might evolve further, we need to recognise a major conceptual issue: that the urban agenda always was, and always will be, a dual one. Cities are both processes (or flows of materials, energy, information), and structures (or physical forms and/or objects, which have a particular 'design' and use various technologies).

An effective urban ecological transformation agenda will have to act in both realms. It will have to propose radically different design and technological solutions, as well as enact major changes in the way individual humans and human institutions operate in the city.

This emphasis on tackling 'both faces of the same coin' - which some urbanists handily call the 'urban hardware' and the 'urban software' - is important because there is a tendency among experts to highlight one and forget the other. Typically, pundits with social and behavioural sciences backgrounds tend to over-emphasise the software aspect of necessary change - cultural values, organisational models, economic policies. On the other hand, experts with natural science, engineering and design backgrounds tend to over-emphasise the necessary changes in urban infrastructure, architecture and machinery, and neglect the cultural, psychological, legal, organisational, economic and political aspects of the necessary transformation.

It should be also mentioned that the urban sustainability agenda is no more just about sustainability - in the sense of mitigating climate change and other negative impacts of urbanization - but also about resilience. Resilience is less about mitigation and more about adaptation to climate change and other threats. It is essentially about 'preparedness', should bad things ever happen. Resilience entered the scene as a new concern after we became aware that some weather disruption (along with the 'peak oil' problem) is already in the pipeline, and can no longer be mitigated or prevented.

Lastly, it must be mentioned that there is no firm consensus in the design and planning profession on what makes a sustainable city. On the contrary, there are some bitter divisions over the key principles. One of them is



The Global School of Sustainability on the Arizona State University campus in the USA.

the controversy over the role of density (or intensity) of development with respect to environmental sustainability and resilience. An apparent majority believes that 'compact', dense cities are more sustainable and points at older European and Asian cities with walkable distances and viable public transport as a working example. A minority - but a growing one - says that a low-density city can be sustainable too, it all depends on what it does with the open space it has and the type of infrastructure it uses, and in any case, now that most of the urban areas are low-density, we have to work with the fabric we have got.

Other urban design and planning controversies have to do with high-tech vs. low-tech solutions; technology fixes vs. radical lifestyle and values change; greenfield sites vs. retrofitting the existing cities; deep-pocket, master-planned projects (à la Masdar in UAE) vs. low-budget, low-tech, grass-roots, evolving approaches (à la Dharavi in Mumbai).

Academia's New Roles: Advocacy and Demonstration

Traditionally, the role of schools, colleges and universities has been teaching and learning. Then research became the big 'second' (especially for universities), and in some cases even the big 'first'.

But now a new trend is discernible. In the age of Knowledge Economy - the idea that nowadays an

advanced economy is more about processing information and ideas than about physical material and objects - academic institutions are expected to churn out highly educated and creative professionals and invent, test and demonstrate new ideas, designs and technologies. In this manner of work, universities and polytechnics are not just expected to support the mainstream, commercial sector, but in fact to create the key players in the high added value economy.

We should expect a similar trend with respect to the global, national and local environmental agendas. Universities, as the places of enormous creative and intellectual power concentration, should be expected to shape and lead the sustainability, resilience, green economy and clean technology agendas. And that is not all; they could (and should) be expected to not only invent, test, patent, commercialise and promote environmental solutions; they should also use them themselves. For example, university business schools could invent, try out and demonstrate new eco-business models, and then apply them in their own management procedures. Equally, schools of architecture, or engineering, could invent, test and demonstrate new eco-friendly design methods and devices and then use them on their own buildings, or anywhere else on their campus.

In the above examples, the proposition clearly is that universities, colleges and polytechnics should go beyond the traditional roles of Teaching and Research and add

the roles of Advocacy and Demonstration. They could do so both in the conventional economic, commercial sense, and in the now emerging, and probably more urgent, environmental sustainability sense.

In fact, the most interesting possibility is doing both at the same time. In the emerging global green economy, universities should consider specialising in research, innovation and advocacy of the green business, ecological design and clean technology solutions and products. It is in this combined, eco-economic domain that they could give their greatest contribution to the society's urgent transition to a sustainable society.

Academic operations - from the teaching curricula to the research programmes - should be majorly committed to advancing the cause of environmental sustainability. And in many cases they already are. But beyond the lecture hall and the research lab, there should be an active role through advocacy, via the media and live participation, for the new economy, new technology and new cultural values and lifestyles.

Lastly, beyond the advocacy function - or perhaps as the most convincing component of it - should come a full application of ecological solutions in the business operations of the very academic institutions themselves. This includes the appearance and the functioning of the physical home of the academia itself - the campus, and the school building. Academic campuses should over time become model examples of how a sustainable society manages responsibly its physical resources - land, water, air, energy, materials, buildings, nature reserves.

Where Next: Educating Cities as Global Leaders

The role of academia as the advocate and the demonstrator of the new way of living, working and managing our physical resources is nowhere more appropriate than in the city. A typical university campus is a mini-urban community in its own right. Campuses are often the size of a town, a suburb, or at least a village or a neighbourhood. Most campuses are situated within cities, often on prominent, visible locations. All this makes them ideal venues for trying out new design, new technology, new business practices, new types of social behaviour.

But what particularly makes campuses suitable to be the avant-garde in society is the unparalleled concentration of 'intelligence' - both natural (staff and students) and artificial (the ICT infrastructure). When this bundle of biological and technological intelligence is put to ecological betterment purposes, we are actually talking about 'eco-intelligence'. This term is not just a clever play on words. It in fact closely resembles a trend that has already been observed in the domain of ecological design and green technology innovation: the trend towards combining 'green' and 'smart' solutions. Generally, in the area of sustainability and environmental

innovation, 'green solutions' refer to designs, technologies and practices that produce useful products or services without inflicting damage to the ecosystem. We also call them 'clean' (as in 'clean-tech'). 'Smart solutions' on the other hand refer to the use of computer and other high technology to enable some form of automation, sensing or (tele)communication. When such devices are used to environmental purposes, or particularly when high-tech is used in a hybrid with some form of clean-tech, then we refer to these solutions (or strategies) as 'green and smart'.

None of these definitions are particularly strict, nor do they need to be. The point is that the term 'eco-intelligent' very well describes both the principle - that something smart (and therefore probably efficient, economic, accurate and reliable) is applied towards 'green ends', and in concrete applications - such as buildings, or control systems which operate both in a clean and automated manner.

The ideal is of course that, first, an entire academic institution and its entire campus with all the buildings, could operate in the 'eco-intelligent' manner. The social spaces of the campus - both green and paved open spaces - are also an important part of the mix. It is here where the informal exchange of ideas takes place; these are the eco-innovation hubs.

Later, following the example of its university, the home city could also assume the 'eco-intelligent' operation mode, i.e. manage its exchange of matter, energy and water with the ecosystem in a transparent, hyper-efficient and automated manner. And the city should also plan for convivial public open space, where new ideas are conceived, argued and traded.

In this proposition we have the possibility of a powerful alliance between the City and the University. This alliance would be geared towards achieving the dual goal of Prosperity and Sustainability - the former via adopting and growing a Knowledge Economy, the latter via growing a Green Economy.

In this model of urban development, almost any city with at least one academic institution - even if it has a modest independent research capacity - could use the campus of that institution as the testing ground and template for its own future development. This means not only close collaboration between the Town Hall (city council) and the Vice-Chancellor's Office (the management of the university) but also a close collaboration with the companies in the city which are interested in growing the green knowledge economy. The end goal is to develop a major portion of the local economy as a cluster of eco-innovation, green business and clean-tech industries.

However, while this seems like a feasible strategy in theory, for any city that has at least one academic campus in its midst (and these days most cities do), it is way more



The *Ecosistema Urbano* project in Madrid.

likely to happen in those cities which are particularly aware of the strategic importance of their education sector.

One would think that such cities are very well represented by the esteemed membership of the IAEC!

Conclusion

We have argued three major propositions in this paper: that cities are at the core of the global environmental crisis but that they nevertheless represent the solution to this crisis, and that this will be achieved when the world adopts the model of an 'urban green economy'; that academic institutions should take a lead in developing this new urban economy, and that they should do so by adding the roles of advocate and demonstrator to its traditional roles of teaching and research; and lastly, that the path to local prosperity and global sustainability must be trailblazed by avant-garde 'eco-intelligent' cities - cities which value their academic institutions as hubs of eco-innovation and which form with them, and with relevant local eco-industries, effective strategic alliances.

The first proposition is hardly a 'proposition' - for people who understand global trends and monitor what some of the most advanced nations and their most prosperous cities are doing, the imperative, and the emerging reality, of an 'urban green economy' is crystal clear.

The second 'proposition' - that universities should take a more proactive role in the local society and economy and

steer the community in the direction of an eco-economy - is perhaps debatable. But evidence is growing that this is exactly what progressive and entrepreneurial universities in Asia, Europe, North America and Australia are doing right now.

Lastly, the final proposition - that IAEC member cities should seize the opportunity to be in the vanguard is indeed just that - a proposition. It is a statement about what appears to be a great opportunity.

This opportunity is great because it is an opportunity to do both well and good. This is a chance for IAEC cities to do the right for their own benefit, as well as the right thing for the benefit of the whole humanity. ●

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Experiences

The Munich Bauzentrum, a Centre of Education and Advice for Citizens on Green Housing

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The Bauzentrum in Munich is an information centre geared to promoting the city's policy on climate protection. Its aims are to provide education, training and advice on how each citizen can contribute to protecting the climate, particularly by reducing emissions of greenhouse gases. Its target groups are not only citizens living in Munich but also all those involved in building or renovating dwellings, especially craft firms, builders and property developers. The work of the Bauzentrum has contributed to substantially altering the building market in the city and making it more sustainable.

It is still impossible today to gauge the full extent of the consequences of ongoing man-made global climate change. It will however certainly involve far-reaching changes to living conditions and lifestyles of populations in many regions of the world.

Today more than 50 % of the world's population lives in cities, and in developed countries the figure reaches approximately 75 %. By 2050 those figures will reach almost 70 % and over 85 % (source: UN/DESA, 2009). To date, particularly in developed countries, cities have been making a considerable contribution to global warming and they will continue to do so in the future. Such cities bear a special responsibility to undertake suitable measures and initiatives of their own to help reduce global warming, the emission of greenhouse gases and the depletion of natural resources.

The City of Munich is aware of that responsibility and is taking up the challenge, developing several programmes to play its part in protecting the world's climate and limiting climate change. These programmes include both direct measures the City can implement itself, e.g. in how the city is run, in municipal bodies like Munich Utilities, or in municipality-owned housing corporations, as well as indirect measures such as extensive funding and subsidies, information, counselling and incentives the



Exterior view of the Munich Bauzentrum.

city provides for the private sector to make its contribution.

A cornerstone of Munich climate protection policy is a raft of measures to educate, train and advise the citizens of the city in the possibilities they have to play their part. This concerns all aspects of their daily life, ranging from provision of basic living requirements to leisure time activities, transportation to accommodation. And here the Munich Bauzentrum plays a key role.

The Munich Bauzentrum is the skills centre in the city working for sustainable building and living. Its goal is to raise environmental awareness and to advise on quality standards compliance among customers and consumers, i.e. Munich's citizens, as well as builders and property developers, i.e. people and firms working in the field of building, renovating and improving living conditions in the city's housing stock. That basic goal marks the Bauzentrum out from traditional occupational and further training institutes, which usually meet the needs of just one of those target groups.

The Munich Bauzentrum belongs to the City of Munich and is funded by it. The information and advice it offers is impartial and neutral, with the main focus on ecology and sustainability, e.g. energy efficiency and environmental friendliness, but also including topics like buildings which are healthy to live in and cater for the needs of disabled people or the elderly. The Bauzentrum also works in the field of ecological building, energy-saving heating and

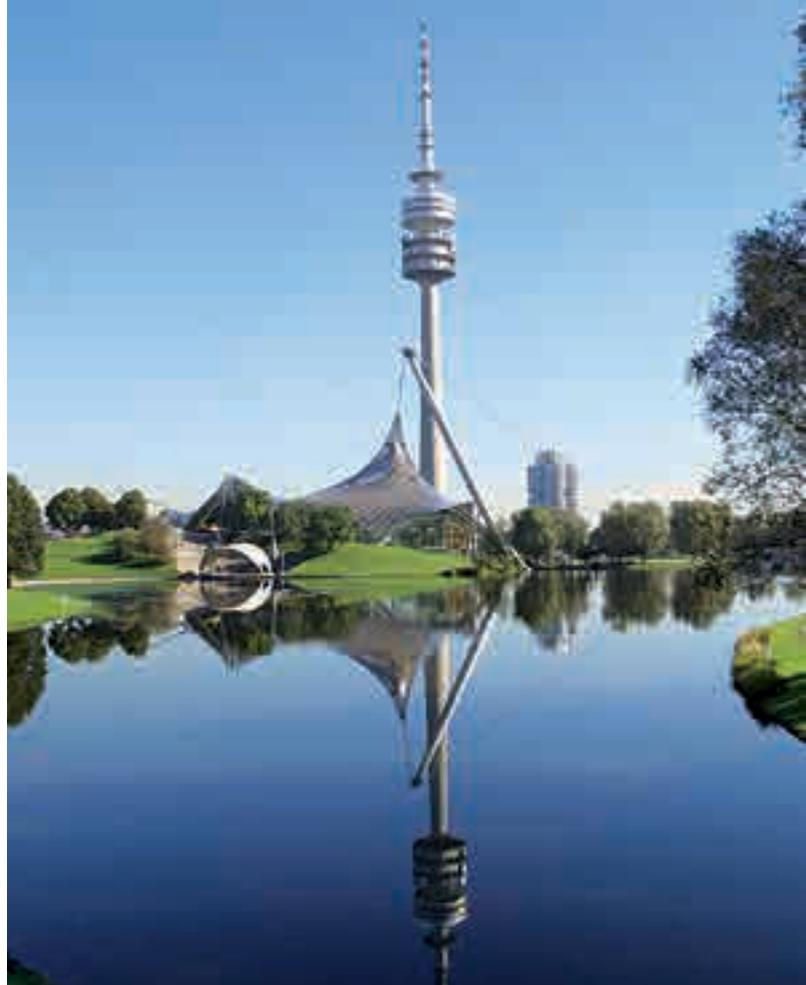


The Englischer Garden. © Michael Nagy / Munich Press Office

ventilation systems, healthy, contaminant-free building materials, or the problems of damp and mould on walls. Economic aspects, such as possibilities for public funding, are also covered.

A wide range of information and advice is offered via information sheets and brochures, an email newsletter,





Olympic Park. © Michael Nagy / Munich Press Office

a website (www.muenchen.de/bauzentrum), a permanent exhibition and several temporary exhibitions, information booths, lectures, seminars, and personal advice by recognized experts. In general, this is offered cost-free. Since Munich's citizens have a very varied cultural and linguistic background, advice in the Bauzentrum is currently available in 16 different languages, ranging from Bosnian through Mandarin Chinese and Greek to Hungarian and the team of multi-lingual counsellors is constantly being extended.

In conjunction with the Munich Adult Education Centre and the city's Advisory Board for the Immigrant Population the Bauzentrum is helping to forge closer links with the people of Munich with an immigrant background.

Advice and counselling are closely matched to the real needs of citizens. If advice is required on a specific topic like changing a heating system, heat-insulating a house or reducing a household's electricity bill, a personal interview can be arranged with an expert in the field and the advice given is quite impartial as regards the product or firm recommended. It is possible to request onsite counselling, at a building site or at the citizen's home, in which case a fee is charged to cover costs.

The Munich Bauzentrum also goes out into the various city precincts and provides regular counselling at town meetings which are scheduled at least once annually in each district of the city. It also runs a stand at all relevant trade fairs and exhibitions. These outreach activities, which are constantly being extended, also include events in department stores and private firms. Likewise, the Bauzentrum works in close partnership with professional

bodies representing architects and manufacturers and craftsmen.

The Bauzentrum operates from its own premises next to the Munich trade fair centre and is open 60 hours each week (Monday to Saturday from 9 a.m. to 7 p.m.). In 2011 it had some 55,000 visitors, organized more than 260 different events and provided cost-free personal counselling for over 8,000 people. Contacts with citizens total over 140,000 a year and have doubled over the last three years. That means that every year one Munich citizen in ten consults the Bauzentrum's services, reflecting its popularity with the city's population.

The Munich Bauzentrum's success can be illustrated by an example. A few years ago, to achieve its goals of protecting the climate and maximizing energy savings in buildings and apartments in Munich, the City set up an incentive scheme to cut energy consumption, with an annual funding budget currently at 14 million euros. To receive a subsidy under the scheme beneficiaries have to meet a special "Munich Quality Standard" which is far more rigorous than the minimum statutory requirements in Germany.

In implementing the scheme it quickly became clear that to meet those standards certain technologies would be required, e.g. specific types of boiler (known as "calorific value boilers"), special thermal insulation techniques, or geothermal power sourcing, which were not then available from many firms in the city. In itself, demand from clients for building or renovation projects had not been sufficient to drive introduction of new technology, so efforts were geared at motivating craftsmen and planners for the new techniques. The



Munich City Council. © Michael Nagy / Munich Press Office

Munich Bauzentrum proceeded to organize appropriate seminars to train local craft firms in the technology needed. In so doing it played a key role in radically changing the city's building market. It was subsequently joined by organizations like the local Chamber of Trade and Crafts of Munich and Upper Bavaria, the Bavarian

Chamber of Architects and the Bavarian Chamber of Civil Engineers. Concurrently, the Bauzentrum organized events to inform clients about these developments to enable them to provide builders, etc. with clear specifications for work to be carried out. ●

Friends of the Environment

Vitor Lippi

Mayor of Sorocaba (Brazil), 2005-2012

The city of Sorocaba is growing very rapidly, which is increasing the government's responsibility for maintaining the quality of city life, and its related urban environmental sustainability. The purpose of this project is to encourage the inhabitants of Sorocaba to take care of their surroundings and to learn from and experience what their city can offer.

Introduction

The municipal area of Sorocaba is an important regional centre in São Paulo State. It covers an area of 449.12 km² and has a population of 586,625 (Geography and Statistical Brazilian Institute, 2010).

Most of Brazil's population lives in cities, which is leading to worsening living conditions and creating an environmental crisis. Environmental education is the best way of dealing with the crisis of civilisation through which we are living.

Environmental education involves reaching out to the public through an ongoing participatory learning process to build a critical awareness of environmental issues, their origin, and the emergence of environmental problems.

Encouraging everyone to adopt changes in individual and collective lifestyles to make Sorocaba a socially and environmentally sustainable city is at the very top of the public agenda. The challenge of this project is to set the conditions for placing people at the very heart of social and environmental issues, enhancing their sense of local action and transmitting the urgency of the need to change lifestyles as soon as possible. This project therefore seeks to qualify, strengthen and equip community leaders, public administrators and local actors to become environmental educators.

It is worth noting that the Sorocaba's city government embodies the strategic principles of Educating Cities and Healthy Cities. The aim is therefore to implement programmes and projects that include the principles recommended by the Charter of Educating Cities to integrate the provision of social, cultural and environmental activities, thereby enhancing the capacity of public bodies and local governance in formal, non-formal and informal education.

This project is infused with Educating City principles and provides all of its inhabitants with an education in the

values and practices of democratic citizenship: respect, tolerance, participation, responsibility and interest in public affairs, its programmes, goods and services, and ensuring a healthy and sustainable environment for all. In this regard, the Friends of the Environment project aims to empower citizens to appropriate their environment and therefore make it better. This involves establishing a participatory process to help build an environmental culture in the city of Sorocaba.

Methodology

The Friends of the Environment project requires integrated actions from the public sector and civil society. To this end, the project partners are: the Departments of Education, the Environment, Health, Civil Defence, and the Department of Public Works and Urban Infrastructure. These Departments set themselves up as a local Integrated Environmental Education Committee - IEEC, which aims to promote and pursue coordinated, linked, permanent and ongoing policies in the city. The Committee has been meeting since March 2011 to identify projects and programmes that can provide an interface with environmental education, and seeks to provide synergies among the various measures.

This project involves school and non-school environmental education in an ongoing and coordinated manner, integrating the various sectors of government and society through educational processes.

The northern quarter of Sorocaba has been chosen as the starting point for the project in the wake of a socio-environmental survey conducted by the Department of the Environment that identified significant negative environmental impacts. The northern quarter of the city is the most populated, with approximately 200,000 inhabitants and a large concentration of commercial and public services. Three decades of decentralisation in State

economic policy led a great many industries to locate along the new roads in this region of the city, causing a significant rise in the number of inhabitants. This area has the highest population density and the lowest family incomes, and is also the part of the city with the least tree cover, making it the most vulnerable in socio-environmental terms.

The municipal government has been making efforts to improve the situation of residents in risk areas; approximately 1,904 families have been relocated to new purpose-built low-cost housing.

At the planning stage, the IEEC proposed a joint approach to reduce urban fires, increase tree coverage in the region, preserve green areas and improve air quality. These actions were rolled out through a series of sub-programmes, as follows:

1. Teacher Training

The Department of the Environment, in partnership with the Department of Education, organised ongoing training courses in environmental education

for teachers. The aim was to promote integration and contact with professionals, who shared their experiences and methods with teachers to help address the issues facing Sorocaba.

2. Training students for the school-based Mega-planting (*Megaplantio*) project

To perform the school-based Mega-planting project, the Department of the Environment provided information to students and teachers at public sector schools in the city to raise their awareness of the importance of afforestation using appropriate species and planting techniques.

3. Environmental Education for Everyone

To train community-based environmental educators, the city's Eco-Parks organised courses for the local population, addressing issues such as environmental education, fauna, flora, water, waste, and organising visits to Sorocaba's Protected Areas.

4. Mega-planting

This is an all-embracing action involving all

The Mega-planting initiative held in December 2010 mobilised 10,000 people.



departments of the Municipal Government of Sorocaba, pursuing the target of planting 50,000 trees. There were 50,000 seedlings planted in December 2010 to recover Permanent Preservation Areas. The aim is to combine improvements to environmental and climatic conditions of the city with the opportunity to help detainees in semi-open detention regime to return to society.¹

This action is part of the Urban Tree Planting Plan, which aims to plant 500,000 trees in Sorocaba by the end of 2012.

5. Fire Prevention

The fire prevention project was implemented in the neighborhoods of Habiteto, Parque das Laranjeiras, Vitória Régia and Parque São Bento. An Environmental Centre consisting of local stakeholders was set up in each neighborhood to identify the social and environmental problems, develop an Action Plan and mobilise residents to improve the quality of their living space. Preparatory meetings

were held in neighborhoods to plan awareness-raising actions, and define strategies and local actions. During this project, the members of the Environmental Centre talked with residents about the importance of reducing fire outbreaks and health impacts through awareness-raising actions and home visits.

Final Considerations

The many actions described above were used to channel environmental information, mobilise the population to become aware of environmental issues, and involve them in tackling urgent challenges such as fires and urban afforestation. The Mega-planting initiative held in December 2010 mobilised 10,000 people. The project made it possible to reforest 300,000 square meters of green area in the northern quarter, enhancing previously run-down areas and enabling greater community integration, making these areas attractive for building parks and hiking and biking paths beyond the green areas.

Environmental education course.





Launch of the community fire prevention campaign.



Measures for mobilising and raising environmental awareness among the school community.

Afforestation measures will continue during 2012, with a new Mega-planting action in the pipeline.

In the same line, the school-based Mega-planting action held throughout 2011, involved 3,000 school children who helped to plant 10,000 seedlings of native species to restore run-down areas of the city.

Turning to the results, we could also mention the 200 people who were trained in the “Environmental Education for Everyone” project; the 140 teachers trained to perform environmental projects revolving around local themes

and the training of community-based environmental educators. This latter project involved 30 members of the Victoria Regia neighborhood Local Centre (residents’ association); 53 women from Laranjeiras walking group; and in the Habiteto and Parque São Bento neighborhoods, the participation of 190 young people from the Youth Ministry at the invitation of the residents’ association of these two neighborhoods. These awareness actions, conducted in August 2011, mobilised 3,550 people in fire prevention activities. Everyone involved became

OUTBREAKS OF FIRES IN THE CITY OF SOROCABA

<i>Month</i>	<i>Outbreaks 2010</i>	<i>Cumulative</i>	<i>Outbreaks 2011</i>	<i>Cumulative</i>
January	7		3	
February	79	86	33	36
March	61	147	47	83
April	112	259	41	124
May	154	413	84	208
June	210	623	151	359
July	420	1043	180	539
August	496	1539	136	675
September	331	1870	145	820
October	59	1929	66	886
November	41	1970	40	926
December	33	2003	16	942



Fire Brigade and City of Sorocaba fire prevention partnership

environmental multipliers, seeking to build bridges between the municipal authorities and the city's residents.

The table below shows a significant reduction in fires in 2011, the year the project was put in place, as a result of a significant increase in community involvement and awareness of the importance of reducing the number of fires started, disposing of waste in appropriate sites and the significance of trees for the city. Finally, it is also the result of training environmental educators.

This social mobilisation is expected to increase awareness among citizens of the importance of caring for the environment and to create positive impacts on public health issues by changing attitudes and ongoing systematic dialogue by local stakeholders to establish a joint process of mobilisation and awareness-raising. This should lead to a significant reduction in outbreaks of fires and help to make sure that rubbish and waste are dumped only in appropriate sites. ●

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Barcelona's Agenda 21 10 Years of Citizen Commitment to Sustainability

Teresa Franquesa

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In 2002, Barcelona established its Local Agenda 21 in a document broadly supported by its citizens and unanimously approved by the City Council: The Citizen Commitment to Sustainability. It is an educational and inspiring text, setting forth ten objectives and inviting each and every individual and organization in the city to willingly take them on.

In order for everyone to be able to join in this collective effort to create a more sustainable city, operational instruments were developed to help stimulate, guide and evaluate the various processes underway. Of note among these is the School Agenda 21 Program that received the Dubai International Award for Best Practices to Improve the Living Environment administered jointly with UN-HABITAT.

As the Commitment's time frame (2002-2012) will soon be coming to completion, it is evident that both the positive results obtained and the process itself have shown it to be an excellent opportunity to raise citizen awareness of environmental issues.

The expression "Agenda 21" was coined at the Earth Summit (Rio de Janeiro, 1992) to refer to the plan of action that States would have to implement in order to transform the current model of development, based on the exploitation of natural resources as if they were unlimited and unequal access to the benefits of those resources, to a new model of development capable of covering the needs of present generations without compromising the capacity of future generations. This is what is known as sustainable development, i.e. development that is durable, efficient and rational in the use of resources and equitable in the distribution of benefits.

The final document produced by the United Nations ten years ago contained a chapter (Chapter 28) dedicated to the role of cities in this ambitious resolution for change. It recognises both the responsibility of cities and their capacity for transformation. As has been observed on several occasions, seldom have a few brief lines of a formal document provoked such an enthusiastic reaction. At present, over 10,000 cities around the

world are drawing up their own Local Agenda 21s through mechanisms involving participation by the local community.

One of these cities is Barcelona, which ushered in the 21st century by signing the Citizen Commitment to Sustainability, a document that is the result of a participatory process involving hundreds of organizations and thousands of individuals.

Citizen Commitment to Sustainability: A City Project

Barcelona's Citizen Commitment to Sustainability is a framework for shared action and a city project that addresses the issue of sustainability as a transversal paradigm, combining the social, economic and environmental dimensions.

It is not the outcome of the work of experts or of a specialized laboratory, but rather of the contributions and visions of many people and groups with different interests that were negotiated and eventually agreed upon by consensus in a joint commitment. The document consists



A convention of signatories of Barcelona's Citizen Commitment to Sustainability.



Volunteers checking the water quality of the Besos River, near Barcelona.

of a preamble stating the principles that the city stands behind in this Commitment, and sets out the 10 main objectives with 10 lines of action for each, to be acted upon between 2002-2012.

Ever since the project was put in place, it has served as a reference point for the City Council as well as for all organizations in Barcelona that wish to play their part in shaping a more sustainable city.

The City Council signed the Commitment in May 2002 (following a preparation period that began with the creation, in 1998, of the Municipal Council for the Environment and Sustainability) and since then it has been signed by approximately 800 citizen organizations. These include large and small businesses, community groups, professional associations, unions, political parties and numerous educational centers ranging from the kindergarten to the university level. The signatories pledge to actively contribute to meeting the set goals and make public the concrete steps they have voluntarily chosen to take in working towards that end. As stated in the Commitment's preamble, sustainability also means shared responsibility: the Barcelona plan of action is the

sum total of all of the plans of action, with more or less ambition, that the city, organizations within it and its citizens have been able to put into effect.

Each signatory has something specific to contribute to this transition process but it is the larger whole, the overall network of citizens, who have the power to bring about the necessary changes. Thus, the City Council not only provides assistance and training to each of the organizations involved to help them carry out their specific plan of action, but has also invested a great deal of energy in strengthening the network through a full program of exchange activities, visits and shared projects.

It is important to note that almost half of the organizations committed to the project are schools (currently 382 schools have signed the Commitment). They are an extremely important element in shaping more sustainable cities, both because of their role in educating students and for the ripple effect within the community, particularly through families. Given that fact, right from the start, schools were especially invited to take part in the process of defining the Commitment and putting it into action, through a specific program: the

KEY DATES

1992	United Nations Conference on Environment and Development (Rio de Janeiro) - The Rio Declaration / Agenda 21
1994	European Conference on Sustainable Cities and Towns (Aalborg) - The city of Barcelona signed the Aalborg Charter (and in 2004 it took on the Aalborg commitments).
1998	The Municipal Council for the Environment and Sustainability was established as a participatory and consultative body to promote the development of Barcelona's Local Agenda 21.
2000	The first steps were taken in setting up the School Agenda 21 Program to bring schools into the process and give support to those that chose to take on the objectives for sustainability. This first went into effect in the 2001 school year. 2002 The Municipal Council for the Environment and Sustainability approved Barcelona's Citizen Commitment to Sustainability - Agenda 21.
2002-2012	Action 21 Phase: Development and implementation of plans of action. Conventions of signatories were held in 2005 and 2010.
2012	Evaluation of the process and results of the initial stage and creation of a New Commitment.

Schools Agenda 21. More than an invitation, it was also a recognition and gesture of support for the work that many schools were already doing in environmental education, and another opportunity to reinforce ties between the school and the city.

The School Agenda 21 Program

Barcelona's School Agenda 21 Program (PA21E) is an initiative focused on schools and operating within the larger framework of the city's Agenda 21. It was put into place in 2001 and last year celebrated its tenth school year in operation. Through this program, educational communities become involved in identifying environmental problems, suggesting solutions and taking on commitments leading to a more sustainable city.

Schools at all non-university levels participate in the PA21E: kindergarten (0-6 years), primary (7-12 years), and secondary (13-18 years), as well as special education schools. The PA21E is a very unique idea that is, at once:

- A program that encourages and supports educational institutions in designing, carrying out and evaluating plans of action in order to become more sustainable schools.
- An opportunity for the educational community to become involved, together with other players, in building a better city within the overall framework of the Citizen Commitment to Sustainability.
- A network of schools that share learning objectives and experiences.
- An aggregate of hundreds of environmental projects being carried out each year. There are 315 projects

underway for the 2011-12 school year of various types and covering a wide range of subjects: water and energy conservation; noise reduction; reducing paper consumption; waste prevention; composting; "school paths" and more sustainable mobility; turning courtyards and gardens into green spaces; creating habitats; organic gardening; biodiversity preservation; responsible buying; improved communication; fostering citizen participation and coexistence, and so on.

- A collective experience focused on the ongoing improvement of the surroundings with a ten-year history and a social impact on thousands of teachers and hundreds of thousands of students and their respective families. During this school year alone the PA21E has involved more than 100,000 students, 8,000 teachers, 1,500 workers in educational institutions and over 70,000 families.
- An ongoing training program for school principals, teachers and school aides.

Thanks to this program, each year more and more schools in Barcelona are incorporating the philosophy of sustainability into their practices, environmental management and curriculums. These are schools that are working to find a balance between theory and practice, where students play a principle role and which tend to draw in the participation of other groups in the community as well.

Barcelona's PA21E is a pioneer program that has been adopted in other cities in Spain, Portugal, and Latin America, which, in 2010, was awarded the Dubai International Award for Best Practices to Improve the

Following a lesson on waste management, this class group decided to bring their morning snacks to school wrapped in cloth.



Learning about capturing solar energy using photovoltaic panels and solar ovens.



Living Environment, in association with the United Nations HABITAT Program.

Results and Challenges

An on-going evaluation system is in place to reassess the program on an annual basis. In addition, two large Conventions of Commitment Signatories were held, one in 2005 and the other in 2010, to jointly evaluate the progress made since the start.

Over its 10 years of existence, the Commitment has achieved results in very different areas. Some of the challenges set out have been fully met, for example, in the 100% treatment of waste water, the shutdown and restoration of an old rubbish dump and the addition of organic waste collection containers placed throughout the city. There has been very significant progress in other areas, among these: the higher percentage of people moving around the city on foot, by bicycle or on public transportation (85% of the total); an increased interest in fair trade products; and a decrease in clean water consumption per capita, placing Barcelona among the cities in Europe that saves most water. In other cases, commendable progress has been made, but more still remains to be accomplished. Examples are the expansion of green areas, energy conservation efforts and the use of renewable energy. There are also cases of pending challenges where little progress has, as yet, been made including, among others: clean air and the reduction of noise pollution; waste prevention; young people's access to housing; and the promotion of sustainable tourism.

Creating the most participatory Agenda 21 possible not only gave it a strong foundation, but, above all, allowed a significant number of people to appreciate its importance and adopt the objectives as theirs. In this regard, throughout these ten years, the Commitment has proven to be an incredible process of citizen-based environmental education.

We now face the challenge of establishing a new commitment that, recognizing the progress made to date, aims to address the pending issues, meet the emerging challenges and set a path for the upcoming future. It is a new commitment meant to reach many families, organizations and businesses which must allow us to move from heightening awareness on environmental issues to a situation in which all citizens are increasingly committed to maintaining a sustainable culture.

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Evaluating proposals offering a broad range of options.



Pushing the sustainability wheels forward to set up a garden in the school playground.





Students participate in setting up a school garden as part of the School Agenda 21 Program.

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Vila Real Biodiversity Conservation Program

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The aim of the Vila Real Biodiversity Conservation Program is to ensure the preservation of the area's rich biological heritage through local development and connecting people to the environment that surrounds them. The program is co-financed by the European Union's Regional Operational Program for Northern Portugal and incorporates a number of project partners, including schools, non-governmental organizations and universities.

The main thrust of the program is directed towards species research and monitoring, targeted information campaigns and raising public awareness in general, and promoting the municipality and its assets.

Origin and Aims of the Program

The desire to develop a biodiversity conservation program dates back to 2009 within the framework of Vila Real's Local Agenda 21. At the time, the importance of Vila Real's biological heritage was clearly understood. A substantial part of the municipality is covered by the National Classified Areas System, which includes the National Network for Protected Areas (national parks) and the European Natura 2000 network (following application of the Birds and Habitats Directives, the cornerstone of the EU's nature conservation policy). Vila Real is home to the Alvão National Park, as well as the Alvão/Marão Site of Community Importance, itself part of the Natura 2000 network. Moreover, a range of unique species can be found in Vila Real, some of which are at risk and covered by a conservation statute. This gives Vila Real a critical role in helping to preserve Europe's genetic heritage.

From this starting point, four key aims were set for the City of Vila Real Biodiversity Conservation Program:

1. Research and monitoring of flora and fauna, considered to be the key factor in increasing levels of knowledge and the driving force behind the focused information campaigns;
2. Application of habitat management methods in order to eradicate the factors that push species towards extinction;

3. Raising public awareness about the richness of local biodiversity with the aim of motivating conservation activity through increasing knowledge;
4. Creating stimuli and promoting social and economic development projects based on the biological value of biodiversity.

The program is now in its third year and is financed through the Northern Portugal Regional Operational Program 2007/2013. This is a financial instrument which supports regional development as part of the EU's National Strategic Reference Framework 2007/2013 for Portugal.

Specific activities within the program

Species Monitoring

The monitoring has been carried out by a team of researchers from the Trás-os-Montes e Alto Douro University (Vila Real). The first step was to identify local flora and fauna, paying special attention to those species which are at risk. The research process included creating inventories cross-referenced to geographic locations, which now allows traceability for Vila Real's biodiversity map. All of this data will be made available on-line within the "Vila Real Biodiversity Portal". The portal will contain all the collated information pertaining to species and



Meeting of volunteers involved in cleaning up riverbanks.

habitats in addition to locations for sights of biological interest. The portal is paramount to the campaign to raise awareness and make information publicly available. The monitoring is carried out using information and communication technology, namely Remote Detection and Geographic Information System.

Management Methods and Volunteer Work

Changes to local ecosystems triggered by external factors can lead to a drop in the population or even the extinction of a species and are one of the main problems in the fight to preserve biodiversity. With this in mind, the team running the program drew up a series of initiatives aimed at stopping or reversing the negative impacts of such changes and maintaining local ecosystems. Volunteers from environmental NGOs have been heavily involved in both identifying external factors and dealing with their impacts.

Numerous tasks are either underway or have already been completed. Of these, we would highlight the "As Rogas dos Rios" initiative, which fosters volunteer work in tackling pollution in Vila Real's waterways.

Volunteers are also engaged in projects all year round. In addition to this clean-up initiative, local volunteers are also involved in building and repairing slopes, constructing passageways for certain species to use during mating seasons, and in projects aimed at increasing public participation and raising awareness regarding the richness of local biodiversity.

The Vila Real Biodiversity Volunteer Bank was initially set up to coordinate the various clean-up programs underway for local waterways. The Volunteer Bank is an informal group of local citizens which provides information on the state of local ecosystems and helps to identify and implement necessary conservation programs. Volunteer numbers have grown as projects have progressed and the group now totals more than 200 people. This shows the importance of engaging local people in projects which affect their surroundings and its fundamental role in creating a sense of social and environmental awareness. This needs to be developed at both a national and EU-wide level, in accordance with the central message of Agenda 21: encouraging citizen participation and the active involvement of citizens in the decision-making process and actions for the environment.

The Vila Real municipal authorities have also set up a cooperation network of local schools, which means that pupils are actively involved in the permanent monitoring of rivers. This will serve as the starting point for the production of a series of materials related to local flora and fauna and their interaction within local ecosystems.

Awareness and Information - the catalysts for a new conscience

From the very beginning, the Vila Real conservation strategy was built on the understanding that spreading knowledge was key. On the one hand, it was understood that making information public would help to promote conservation in general and help change attitudes in



Publicity campaign on local public transport.



Observing nocturnal butterflies as part of the "Nature holidays".



A "Biodiverse gathering".

relation to biodiversity ("To Protect is to Know" is one of the program's slogans). On the other, knowledge helps to create a community identity and the feeling of local people being stakeholders in their own municipality, which encourages development in keeping with local values.

Building upon this understanding, the municipality created numerous communication strategies aimed at different target groups, including local young people, inhabitants of the city of Vila Real and also more specific demographics, such as those with an interest in tourism or the environment. Some of the examples of the information campaigns organized throughout the project include:

- 1) General Program Awareness Campaign: for 3 months in 2010, a number of species were displayed on public transport in Vila Real. The species used were chosen for their protection status (at risk), and additionally for the interest they could create amongst the public. The aim was to raise awareness more widely and to encourage people to take an interest.
- 2) "Biodiverse gatherings": various meetings were organized to bring together the general public and the scientific community. The aim was to create an informal atmosphere, typical of a Portuguese café, where people could discuss the main challenges and possible solutions to conserving biodiversity. Each event has a financial sponsor and schools are involved in producing material about a featured species.
- 3) Visits and workshops based on different themes (sustainable tourism, events for specialized journalists, research conferences, etc.).
- 4) School holiday program, known as "Nature holidays" - the aim is to find and learn more about local species, with a view to ensuring their conservation. Observing nocturnal butterflies and visiting rivers to learn about riverbank species are examples of some of the activities organized.
- 5) Setting up a website to accompany the program, www.cm-vilareal.pt/biodiversidade, and a Facebook profile which already has 5,000 friends.
- 6) Vila Real Biodiversity Photography Workshop - the aim of this is to attract professional photographers, help young people learn photography skills as well as

make people aware of the rich biodiversity that Vila Real has to offer. The result will be greater interest in their local heritage.

- 7) The Vila Real Biodiversity Photography Competition - used to increase the stock of images of local biodiversity.
- 8) Further artistic events combining cultural development and scientific knowledge.

Partners

The Vila Real Biodiversity Program is being run by the Municipality of Vila Real in conjunction with a number of other local and national bodies. One of the project partners is TAGIS - the Portuguese Butterfly Conservation Centre - which, in addition to having an active role in raising public awareness, has contributed its scientific knowledge to helping to preserve the habitat of the *Maculinea alcon*.

The Parques Com Vida Association is another of the project partners. The association, which consists of local business owners linked to the tourism and restaurant trade, joined the program as they understood the importance of being able to integrate environmental values into their business activity. This sets their businesses apart and gives them an edge over competitors. Their involvement made the "Biodiverse gatherings" possible. Furthermore, they also produced information on the behavior of the monitored species which was given out in the guides produced for various species.

QUERCUS (an environmental NGO) is a project partner working with the program steering committee as well as having members actively involved in local volunteer work.

Impact of the Program

The Vila Real Biodiversity Conservation Program has been running for two years already and 2012 is set to see another significant push to raise public awareness. The program is seen as a benchmark in its field and its positive impact has been duly recognized. This is despite the fact that we have not yet been able to conduct a full appraisal of all of the outcomes of the completed projects or those still in progress.



The project is considered to be a benchmark as it was the municipality itself that prioritized the protection of its biodiversity. This led to investments totaling close to 1.7 million Euros for this development plan and it has subsequently been repeatedly used as a national case study.

The gradual increase in the volume of volunteers signing up to the volunteer bank is worthy of note within the context of citizen participation and spreading knowledge. The Vila Real Volunteer Bank plans to continue its work to protect local heritage and biodiversity, incorporating a number of new initiatives. This informal body is beginning to organize itself as an autonomous civil society group and is providing a forum for people and organizations to come together in order to focus on a clear aim. It is showing people that novel ways of taking action can be developed.

The efforts put into raising awareness have also been well received, notably amongst the student population. This is evidenced by the number of projects and agreements established recently with local schools, which will lead to a permanent water resource monitoring program being set up. In a similar vein, this can also be seen by the growing interest amongst the student population and their increasing participation in a number of the projects. ●



Monitored species.

Changwon City, a Leader in Sharing and Fostering Green Growth

Park Dong-cheol

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Changwon City has a special love for green. The city has carried out a solar house charity project designed to provide green energy to the more vulnerable segments of society in partnership with the local companies. In addition, Changwon has completed construction on a solar power station which is located at the site of the city-operated sewage treatment plant with the aim of changing the negative image of the facility. Changwon's efforts towards a green city will continue.

The era of fossil fuel energy is coming to an end as global pollution reaches serious levels, signaling ground-shifting changes in energy resources. Nonetheless, developing alternative renewable energy sources to replace fossil fuel energy which currently accounts for 85% of the global energy supply, is both a daunting task and a great challenge.

Countries around the world have been developing new ways to tackle environmental challenges and some are at the forefront of that effort, applying their own technology to their specific environmental needs and issues. Such ongoing global efforts reaffirm the importance and the promising prospect of new and renewable energy. However, citizen commitment and participation is as essential as governmental support and technological

capacity in ushering in this new era.

There is no question that, today, green growth is high on almost every nation's policy agenda, and is what the global community should be pursuing.

At this critical juncture, the question might be asked as to where South Korea's green industry stands and who is leading the nation's green growth efforts. In particular, most citizens may wonder who benefits from green growth, and Changwon City must be able to offer clear answers to these questions without any hesitation.

Changwon City has invested great efforts in green growth sharing, and taken steps to become a "Green City" where every citizen can enjoy the benefits of green energy. Following here we offer a description of this city's green programs.

Nubija: the Changwon public bicycles transport system.



Green building with photovoltaic panels.



First, Changwon City has carried out a solar house charity project designed to provide green energy to the more vulnerable segments of our society. Under the scheme, local companies drew up plans to install photovoltaic and solar heating systems in some homes and facilities in order to offer green energy without any associated financial burden.

In March 2011, Changwon City, in partnership with four local companies specialized in new and renewable energy, provided energy to a total of 12 facilities and households,

including social welfare centers, homes with disabled family members, and single-mother households. The participating companies were in charge of providing the photovoltaic plates manufactured at their plants and/or putting the solar systems in place.

The social repercussions of the solar house charity project have shown it to be an exemplary case of green companies and green growth sharing, in action.

Secondly, Changwon City embarked on the green home project, and a "green home boom" has taken hold in this



city. There have been up to 3-year waiting lists for some households that have applied for these government- and city-subsidized green homes, reflecting their popularity among citizens.

By adopting solar energy, residents at green homes have seen an 86% reduction in monthly energy costs and enjoy solar-heated warm water throughout the year, while contributing to energy efficiency by using natural energy sources.

Changwon City has built 2,700 such homes to date and,

with the assistance of companies specialized in solar energy issues, has even successfully installed the green home system in houses requiring the resolution of specific technical problems.

Thirdly, Changwon has completed construction of a solar power station, opening up possibilities for widely-shared green growth. This solar power station is located at the site of the city-operated sewage treatment plant with the aim of changing the negative image of that facility and mitigating environmental pollution.

KISCO, a local solar cell manufacturer, invested 3 billion KRW in building the 800kW solar power plant that it donated to the city. This philanthropic gesture on the company's part reflects Changwon City's philosophy regarding green growth sharing and its success in promoting active participation of corporate cooperation in green projects.

The solar power plant generates electricity through solar energy and earns an estimated 350 million KRW in annual profits. These profits will be applied to other green growth initiatives in Changwon City, including green energy sharing projects to aid those in need of energy assistance.

Changwon's citizens understand what green growth sharing means and recognize that their city plays a key role in green energy education.

The "Nubija" public bicycles are a common sight in Changwon, moving along the bike paths set up throughout the city. Among the many using the Nubija bicycles are students commuting to and from school. Solar-powered homes, trees and flowers are everywhere in the city.

The traffic lights in Changwon City are wind-operated and the street lamps in the parks are powered by solar batteries. Mountain trails are lit by photovoltaic powered lights. District officials use electric vehicles to travel to towns on the city's outskirts to attend to their administrative duties.

Changwon City, recognized for the good quality of life it offers, is one of Korea's most eco-friendly cities and has been called "Korea's Freiburg." ●



12th International Congress of Educating Cities "Green Environment,"

Under the theme of *Green Environment, Creative Education*, the 12th International Congress of Educating Cities was held from 25 to 29 April 2012 in Changwon, Republic of Korea. Based on the Educating Cities Charter, the principles resulting from the Earth Summit (Rio de Janeiro, 1992), and the Objectives of the UN Decade of Education for Sustainable Development, the participants at the 12th International Congress of Educating Cities discussed and debated what roles they must play, and how to face the challenges to increase sustainability not just with regard to the environment, but also in social, cultural and economic terms. This Congress also explored and exchanged innovative educational practices and experiences to transform cities into sustainable ones that would lead to a better quality of life for all citizens.

Representatives from 54 member cities from 17 countries and 298 non-member cities from 25 countries, as well as experts, practitioners, members of various international organizations and representatives of civil society attended to this Congress, the first held in Asia. Special mention should be made of the fact that 154 cities from the Asia Pacific region participated in the Congress.

Participants of this Congress declare that Educating Cities should be committed to the following principles:

- Educating Cities must make conscious efforts to transform perspectives and ways of thinking and living into ones that are more harmonious and respectful of nature. That change would require creative education to foster people's critical understanding and keen awareness of general interests and the common good, of solidarity, of culture, and of the environment.
- Educating Cities must work to change the ways cities are governed; to update city infrastructures by applying sustainable criteria; to devise effective policies on public space, ecomobility and biodiversity; and to develop cooperative actions for sustainable urban living.
- Educating Cities must encourage more actions taken and increase communication channels in order to develop an exchange of good practices and put into place strategic plans for urban sustainability in the areas of

transportation, tourism, energy, and urban agriculture as well as architecture and design. Furthermore, Educating Cities must anticipate the necessary changes, taking into consideration the causes and consequences of climate change and focusing on solutions to it.

- Educating Cities must move towards democratic, inclusive and ecological governance which supports citizen participation and coexistence. Educating Cities must seek an integrated networking of social values, and provide creative education for citizens to take the necessary steps towards sustainable development and to increase awareness that sustainable living is important, desirable, and achievable. Urban policies

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Creative Education" The Changwon Declaration

and programs must encourage equity and equal opportunities, regardless of gender, ethnic or cultural origins, social-economic status, religion or physical condition.

- Educating Cities must stimulate creative education within the context of lifelong education. They must create innovative educational mechanisms which go beyond the conventional, school-based educational system, and embrace education in the city at large, where urban space becomes a lifelong learning center and a base for the creative, communicative, and critical practice of education. As a flexible, enriching open space, the city offers a means to put into practice the

importance of a sustainable environment, cultural diversity, and social justice.

This Congress has stressed the notion that the changes for a sustainable environment must occur in, by and for the Educating City. Creative education is absolutely necessary in this course of changes, transformations, and innovations. A citizenry that is responsible, participatory, communicative, creative, and aware plays an active role in co-building the sustainable city.

Educating Cities agree to jointly put these principles into practice in order to achieve cohesion and solidarity among human beings as well as their harmonious coexistence with nature. ●

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