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Climate Proofing Urban Development

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Partners of Connective Cities



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Introduction

Almost 30 local practitioners from 12 cities, 10 countries and four continents accepted the invitation of Connective Cities and the City of Dortmund to a dialogue event on the topic of 'Climate proofing urban development', which took place from 3 to 5 September 2019 in Dortmund, Germany.

Climate proofing urban development

The impacts of climate change include extreme weather events such as heavy rainfalls, severe thunderstorms, prolonged droughts and heat waves. These impacts pose major challenges for cities around the world. Although climate change is a global challenge, adapting to its impacts is largely a local process. In addition, climate change is a cross-cutting issue that affects all areas and departments of a city administration and therefore requires a cross-departmental approach, as well as citizen participation.

The concept – From the community of practice to projects

Since its launch in 2014, the international community of practice for sustainable urban development Connective Cities has already conducted more than 30 workshops with over 2,000 participants from more than 200 cities in 65 countries worldwide. Initially it focused on launching a community of practice among local practitioners from the Global North and South. Today the dialogue formats of Connective Cities aim to jointly develop concrete and promising ideas for projects until they are ready for implementation. Currently several projects that were supported by Connective Cities in their planning process are already in the implementation phase. Connective Cities provided the appropriate expertise through expert missions, study tours and local project workshops, and facilitated access to international funding opportunities (among others by the Service Agency Communities in One World of Engagement Global). The countries involved in these learning processes include Thailand, Brazil, Jordan, Tunisia, Ukraine, Lebanon, Mozambique and Germany. Dialogue events are the starting point for the action planning where ideas for projects are developed.





The learning journey across the three-day conference builds upon a logical sequence of four parts. Day one begins with expert inputs that provide an in-depth introduction to the topic. After that, the project examples and the challenges associated with their implementation are presented by the participating cities in working groups. On day two, several of these specific challenges are discussed in-depth in peer learning sessions, and possible approaches and ideas for successfully dealing with them are collected from the cities. On day three, participants take the most promising approaches for concrete implementation and develop them into project ideas.

The event concludes with a special excursion organised by the host city. In the case of Dortmund the participants visited PHOENIX lake – a mega-project of the City of Dortmund designed to transform a former steel smelter into a residential and recreational area with an artificial lake, offering employment and leisure opportunities.

Connective Cities is implemented as a cooperation project by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Engagement Global gGmbH/the Service Agency Communities in One World and the Association of German Cities, on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ).

Read more:
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What are the implications of climate proofing for cities?

For Dortmund, adapting climate change is a home game. For scientists, it is just one of several challenges facing cities in the Global South. And for representatives of the City of Kumasi in Ghana it is primarily a matter of cooperation between cities.



The participants visit Dortmund's PHOENIX lake

The transformation of urban infrastructure is nothing new to the City of Dortmund. The decline of the coal and steel industries and a number of major breweries meant that Dortmund was affected by structural change early on – from the 1970s onward. The last coal mine closed in 1987 and the last steel factory in 2001. At that time the unemployment rate was over 15%.

In response to these developments a new land-use plan was approved in 2004, which has since been implemented. The plan aims to re-purpose brownfield land (which accounts for some 10% of the city's land) for housing, work and land restoration, as well as to protect public spaces. Ultimately this is designed to promote the city's development in a way that is socially, environmentally and economically sound. This has been a success story. The percentage of green infrastructure has been increased from 47% (1985) to 63% (2019). Dortmund has also succeeded in persuading companies in state-of-the-art sectors – micro-electro-mechanical systems (MEMS), IT, biotechnology and logistics – to locate their operations in the city. The unemployment rate has been almost halved, and the economy is now

multisectoral. With over 50,000 students, Dortmund has also emerged as a science hub, and as the city rejuvenates it is attracting new citizens. The restored land is helping to mitigate climate change and forms reservoirs and flood areas in case of torrential rainfall.

For Dortmund – a footballing city – climate change is a home game. This was the title of the presentation given by Michael Leischner, Head of Department for Climate Protection, Air Pollution Control and Noise Reduction in the City of Dortmund. This in two senses: Those responsible in the city administration not only know they need to find local solutions to local problems, they also know in principle how to do it. Work is currently underway on master plans, including a master plan for adapting to climate change, in order to develop visions for the city's future that include goals and instruments and to involve all the public and private 'players' at an early stage. "Our citizens are more intelligent than any bureaucracy", was how Mayor Ullrich Sierau put it in his welcome address. And, "We need to establish as many ecosystems as possible".

The cities of the Global South will be hit much harder by the impacts of climate change than those in the Global North, and at the same time have fewer resources with which to adapt to these developments. This was demonstrated by Prof. Dr. Stefan Greiving, Executive Director of the School of Spatial Planning at the Technical University of Dortmund in his global overview. Urban infrastructure in the South is also hit harder by rapid urbanisation. And not infrequently, in the cities of the South the environmental impacts of urbanisation are more severe than those of climate change. The interrelationships between population growth, social change and urbanisation are complex, however, and it is these interrelationships that cause environmental change and can exacerbate the impacts of climate change. Jakarta (Indonesia), for instance, sinks by approximately 25 cm every year as a result of the overuse of groundwater in conjunction with a simultaneous increase in surface sealing. Coastal cities in the South are also at particular risk from storm surges and coastal erosion.

Moreover, not all citizens within a city are affected to the same extent. Some areas are badly affected, others less so. When planning adaptation measures, issues of environmental justice therefore also arise.

There are currently still major uncertainties and very different scenarios when it comes to forecasting the speed and severity of climate change and its impacts.

Prof. Dr. Greiving therefore recommends that we take a holistic view of change which

- captures the demands created by urbanisation and climate change
- continuously re-evaluates the data available and allows for flexible adjustment where necessary
- assesses the impacts of climate change on a participatory basis, and
- takes social issues into account in adaptation measures.



Discussing challenges and first ideas for solutions

Cities do not function in isolation. They function as a system, which makes the activities of one affect the other. In his presentation on [climate proofing from an African perspective](#) Justice Paa Kwesi Simmons, Chief Planning Officer at Ejisu Municipal Assembly in Ghana, pointed this out explicitly and described his experience in Ghana. There, the impacts of climate change are already visible in the form of droughts, flooding and coastal erosion, even though the country makes only a minor contribution to global climate change. This has made rural poverty worse and exacerbated the process of land degradation and desertification. Investment in agriculture is becoming more expensive, more risky and less profitable.

Yet cities can also learn from each other. The municipality of Ejisu is located just 18 km from the city of Kumasi. Kumasi is a university city, and with its population of almost 3 million is now the largest city in the country. A student exchange programme between the two universities of Dortmund and Kumasi has already

been in place since 1986. In 2011 the two cities agreed to a climate partnership within the framework of the support programme of the Service Agency Communities in One World of Engagement Global. In this setting, Kumasi was able to benefit from the lessons learned on transformation by Dortmund. Dortmund's approach was adapted to conditions in Kumasi and backed up by scientific expertise provided by the Technical University of Dortmund and the Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi. The result: regeneration of the urban forests in Kumasi and Ejisu, the construction of a composting plant, and pipes to capture methane gas at the municipal landfill, which is now being used to produce electricity. In Kwesi Simmons' view, the key factors for success here were:

- continuous education of the general population on the environment and climate change
- lobbying higher political authorities and policy-makers
- building a strong institutional framework and linkages
- in particular, the sharing of lessons learned with Dortmund (Dortmund and Kumasi had already been linked through the climate partnership in 2011, and these links are now being further developed through Connective Cities).

Workshops – The challenges involved in climate proofing



Collecting challenges centrally and identifying commonalities.

In the workshops the urban practitioners presented their strategies and projects for climate proofing urban development and discussed differences, commonalities and lessons learned in their project implementation. They were supported in this by other participants.

Working group I: Cross-departmental coordination for strategies and master plans to protect the climate

The speakers and their projects were:

- Sophie Arens: Master Plan for Integrated Climate Proofing of the City of Dortmund (MiKaDo)
- Joshua Nii Noye Tetteh-Nortey: 'Keep Kumasi Clean & Green' project, City of Kumasi, Metropolitan Assembly, Ghana
- Ratko Dimovski: The Resilient Skopje Strategy, City of Skopje, North Macedonia
- Axel Schmidt Grael: Planning for a Resilient Niterói, City of Niterói, Brazil

Differences were apparent above all in the profiles of the respective municipalities. In one municipality, responsibility for climate adaptation was assigned to a project management unit attached to the mayor's office. In another it was the environmental department, and in another the planning department.



Gaining an understanding for the challenges presented in municipalities

The commonalities predominated, however. All the municipalities faced difficulties with cross-departmental cooperation. For instance, nature-based urban planning solutions are designed to reduce the risk of heat, flooding and water shortage. However, these approaches require cooperation between the urban planning, building, greening and environmental departments, and possibly also those for schools, youth and families. Often, though, each one of these departments sets itself different priorities. Nonetheless, all those responsible are highly motivated to implement their projects and endeavour to link climate proofing urban development measures with social improvements.

It quickly became evident that raising awareness of the impacts of climate change and corresponding local adaptation strategies are key to cooperation. This applies to municipal employees and citizens alike, particularly in residential areas that are badly affected by climate change. It may therefore be helpful to begin with smaller pilot projects involving motivated staff members from different departments and/or citizens, in order to raise awareness in this way. Specific internal planning processes, such as the planning of critical infrastructure like a civil protection centre, can also open the door for cross-departmental cooperation. Ultimately, adaptation processes are nothing new for municipalities. A listing and appreciation of achievements already accomplished in the field of environmental protection and climate change mitigation and

adaptation, some of which municipal staff do not even realise are climate-related, can motivate them to act on a more cross-departmental basis.

On the other hand, the funding of projects on environmental justice and the reduction of inequality in climate adaptation remained an open question.

Working group II: Mapping climate risks and resources for informed urban planning



Noting down identified challenges

The speakers and their projects were:

- Ulrich Axt-Kittner: [Urban Climate Management System \(UCMS\)](#), City of Gelsenkirchen, Germany
- Dr. Patricia Himschoot: [Urban Green Infrastructure \(UGI\) for Climate Change Adaptation in Informal Settlements](#), City of Buenos Aires, Argentina
- Christine Mwendu Kivuva: [Implementing Kenya's Climate Change Adaptation Plan](#), Nairobi City County, Kenya

Although the topic was a different one, a similar picture emerged in this working group too. Differences between the municipalities were apparent primarily with regard to their respective profiles and the degree of bureaucratisation of decision-making processes. In some cases the approach to identifying projects was more top-down, in others it was more bottom-up. Whether the initial idea should come from the municipality itself or from external stakeholders therefore remained an open question.

Nevertheless, one thing was clear to all concerned: unless citizens are involved in project planning and implementation there can be no guarantee of project success.

Participation by all stakeholders in the process was seen as key. Here too, participants saw the fragmentation of the municipality into numerous specialised departments and offices as an obstacle to project implementation. Nonetheless they were optimistic that the common threat posed by climate change will in the medium term promote cooperation. Creating and promoting new networks and multi-stakeholder partnerships was therefore a strategy for promoting interdisciplinary exchange in all three municipalities.

There are now a number of tools to support the mapping of climate risks, such as Participatory 3-Dimensional Mapping (P3DM). Involving the local community and using available materials, such tools allow the production of maps that identify climate-related risks and enable clear planning of adaptation measures. One focus is on aggregating local expert knowledge and involving all affected groups. The data obtained enables more targeted consultation in the planning process and facilitates interdisciplinary cooperation. Some of these tools should be universally applicable in many countries, as the basic problems of climate change and urban infrastructure are similar. Tools that are simply designed require less complex data. They can be used to quickly provide an initial overview.

A further lesson learned was that 'champions' and 'natural authorities', as well as sound financial support, can play a crucial role in driving the process forward.

Working group III: Integrating climate adaptation measures in the urban built environment



Discussing challenges and first ideas for solutions

The speakers and their projects were:

- Yanna Chaikovska and Mariia Druzhynina: Reconstruction and Greening of Kosmonautiv Avenue in Vinnytsia, Vinnytsia Institute for Urban Development, Ukraine
- Prof. Islam El Ghonaimy: Green Roofs: Facing Global Warming in Arabian Gulfs Regions, University of Bahrain, Bahrain
- Michael Leischner: How Does Green Roofing Get into Town, City of Dortmund, Germany
- Sharin Govender and Nikosinath Mthethwa: Climate Proofing the Empangeni Revitalization Plan in uMhlathuze, City of uMhlathuze, South Africa

This group focussed in particular on the national framework for building and conversion measures, including safety regulations. National legislation defines and determines the decision-making authority at the local level – for all projects. The project examples differed primarily in terms of their various starting points or degrees of maturity, for example with regard to legislation or the quality of the existing building stock.

Participants noted that during implementation, it is important that municipal policy-makers and administrators with decision-making authority support each other so that conflicting elements (for example in the case of Dortmund the stability of roofs versus the greening of roofs) can be resolved appropriately and legally underpinned. One question that did remain open, however, was what the appropriate strategies

would be to persuade decision-makers of the importance of climate-adaptation measures.

As with the other groups, this group also saw climate adaptation measures in the urban built environment as a cross-cutting task, both within the municipality and among citizens. A whole-of-society approach (that includes informal groups) will sometimes be needed in order to facilitate and enable implementation. Incentives such as subsidies for adaptation measures or the reduction of service fees (such as for rainwater drainage) can positively influence investment decisions by property owners.

It is also important to link the measures to other dominant trends within society (such as digitalisation) in order to increase their acceptance. Adaptation to climate change is only one element of the transformation to a more liveable, more comfortable, modern city with a higher quality of life. An integrated approach will make scaling-up and mainstreaming climate proofing more attractive.

One question that did remain open was how possible negative social aspects of a successful upgrade of the housing stock and of entire districts might be prevented (a point discussed in conjunction with gentrification).

From challenges to solutions – Peer-to-peer learning



Discussion on solutions for the development of comprehensive climate proofing strategies

Day two of the conference was all about peer-to-peer learning. For six of the 12 project examples the challenges were discussed in detail, and the wealth of experience gained in 12 cities and 10 countries was used to develop possible solutions for individual cities. This involved first collecting numerous ideas and then arranging them in order of priority for each specific case. The examples were as follows:

Integrating climate proofing measures into standardised planning procedures

From the wealth of proposals put forward, the presenter preferred the following solutions:

- Create a continuous dialogue with other cities on the topic.
- Design a 10-year-plan with integrated climate proofing measures for each department with the following core elements:
 - Performance agreements with performance indicators, signed by each head of department.
 - A traffic light system, in case it emerges that indicators cannot be achieved as planned.

Methods and communication technologies to improve cooperation in case of disaster and under normal conditions

From the wealth of proposals put forward, the presenter preferred the following solutions:

- Motivate more inhabitants from the affected neighbourhoods to get actively involved as volunteers, through
 - 'Ambassadors', for example footballers, or through links to a political group.
 - Incentives such as school scholarships for young volunteers.
- Create a flexible communication structure with filter options that allow people to choose how, and how often, they would like to be contacted.

Improving the database and collecting data for climate-proofed urban planning

From the wealth of proposals put forward, the presenter preferred the following solutions:

- Collect baseline data by simple means as effectively as possible, for example by analysing aerial and satellite images, Google Maps etc.
- Perform regular reviews/updates in order to make changes transparent.
- Strengthen cooperation and dialogue between departments in order to improve the database and to identify and prioritise suitable measures more easily.
- Support the process with microclimate modelling and mapping systems.

Improving rainwater management to prevent flooding and support irrigation



Weighing different approaches in the discussion of the situation in Buenos Aires, Argentina

From the wealth of proposals put forward, the presenter preferred the following solutions:

- For the areas at higher altitudes: survey what already exists and what solutions that are as simple as possible can be (further) developed, such as use of natural slopes, improvement of agricultural ditches and drainage systems along the roads.
- For the valley areas:
 - Create ditches below large roads, for example as part of road repair works, and at the same time tap international funding sources.
 - Drain flood water in agricultural areas and their irrigation/drainage systems.
 - Create several small artificial lakes as reservoirs and recreational areas.

Improving solid waste management in neighbouring residential areas to prevent the blockage of sewers

From the wealth of proposals put forward, the presenter preferred the following solutions:

- Improve environmental awareness:
 - Persuade key persons in the respective communities to work for a clean neighbourhood and take their waste to collecting points.
 - Launch school campaigns to raise awareness among the younger generation.
- Create incentives, for example announce prizes for the cleanest neighbourhood.
- Enforce existing laws more effectively by increasing checks.

The sixth case example – ‘Protecting trees planted on school grounds in Kumasi, Ghana’ was later developed into an idea for a concrete project, and is therefore covered in the next section.

From possible solutions to concrete project ideas



Discussing options for a concrete action plan

On day three of the event six ideas for concrete projects with the potential for implementation were developed

1. Protecting school trees in Kumasi, Ghana
2. Green infrastructure in informal settlements to reduce heat islands in Buenos Aires, Argentina
3. Revitalising small rivers in the City of Vinnytsia, Ukraine
4. Climate proofing of the Empangeni Central Business District in the City of uMhlathuze, South Africa
5. Climate protection planning for the City of Niterói, Brazil
6. Developing a climate protection strategy for Nairobi, Kenya.

Protecting school trees in Kumasi, Ghana

Due to rapid urbanisation over the last 30 years Kumasi, formerly known as West Africa's 'garden city', now suffers from extensive surface sealing and the loss of almost 40% of its green spaces. Consequently, as part of the cross-sectoral project 'Keep Kumasi Clean & Green', Kumasi is conducting reforestation measures, with the aim of planting approximately 120,000 trees between 2017 and 2020. Almost 60,000 trees have already been planted, among other places on public school grounds. However, the seedlings are threatened by aridity and damage caused by animals, particularly cattle. The project is therefore designed to improve irrigation and protect the trees against animals. To this end the following steps were planned:

- Identify three pilot schools.
- Identify different tree varieties and plant them on a trial basis.
- Map all the trees already planted and those yet to be planted at the schools.
- Test various (electrified) protective fences and involve school students, parents and teachers.
- Test three different irrigation methods at the pilot schools.

The estimated time frame for implementation of all these steps is 15-18 months.

Green infrastructure in informal settlements to reduce heat islands in Buenos Aires, Argentina

The informal settlements built in Buenos Aires are very cramped, with few green spaces or space for planting. Moreover, the housing stock is of inferior quality, so green roofs are usually not an option due to stability reasons. As a result, on hot days heat builds up. The informal settlements are the city's heat islands. The project is therefore designed to reduce the settlements' vulnerability to heat by implementing innovative greening strategies.

To this end the following steps were planned:

- Within the 'Villas' settlement, identify pilot areas with different spatial conditions (such as residential areas, schools, commercial areas).
- Develop solutions for the respective situations.
- Involve the respective communities/inhabitants in developing the solutions (for example through planning workshops, city labs etc.).
- Conduct first activities rapidly in order to demonstrate results and promote acceptance (for example mobile installation of greening: 'mobile trees', painting of spaces and roofs with heat reflective paint, etc.).
- Evaluate the results of the activities and scale up those that succeed.

The estimated time frame for implementation of all these steps is 7-9 months.

Revitalising small rivers in the City of Vinnytsia, Ukraine



Group discussion during the project planning

The City of Vinnytsia has a number of small rivers. These could help mitigate climate events such as heavy rainfall and heat and at the same time serve as liveable recreational areas. Currently many of these rivers are very dirty and ecologically dilapidated. The project is therefore designed to stop pollution of the rivers at source, and develop them as recreational areas.

To this end the following steps were planned:

- Form a cross-departmental task force tasked to develop a strategy for cleaning the rivers and river-banks sustainably.
- Gain public acceptance and support for the project, and raise awareness through
 - public information measures and educational programmes in schools.
 - an international exhibition of similar examples of restoration and recovery of public spaces.
 - Involve experts from other cities.

The estimated time frame for implementation of all these steps is 16-18 months.

Climate proofing the Empangeni Central Business District in the City of uMhlathuze, South Africa



Presenting the local situation in the city as part of the action planning

Located at Richards Bay, the City of uMhlathuze has repeatedly been struck by heavy rainfall and storm surges in recent years. The problem is further exacerbated by the partially unplanned urbanisation process, which has led to cramped spaces and surface sealing that make it more difficult to absorb and drain water in a controlled way. The project is therefore designed to make the Central Business District in the City of uMhlathuze more liveable and improve its capacity to absorb rain and storm water, among other things through water-permeable surfaces and landscaping in the district public areas.

To this end the following steps were planned to prepare for implementation:

- Assess all the materials and technologies required based on a landscaping plan and stronger cross-departmental cooperation (green team) that takes into account good practices in other cities.
- Prepare a study on the benefits of various alternative materials.
- Develop a planning and implementation approach that involves collaboration between landscaping and road construction.

It is estimated that the preparatory studies will take approximately 4-6 months. Developing a collaborative planning and implementation approach, however, is seen as a process that is likely to take approximately 3-5 years, including implementation.

Climate protection planning for the City of Niterói, Brazil



Turning possible solutions into an action plan for a project idea

Niterói has already taken a number of steps to better protect the population living in informal settlements and unsafe slopes, to relocate those hardest hit and to stabilise the slopes there. The measures to date will now be incorporated into a comprehensive climate proofing master plan that includes all risks and stakeholders in Niterói and prescribes clearly defined targets and measures for implementation.

To this end the following initial steps were planned:

- Identify and mobilise all relevant stakeholders in the municipality, the business community and civil society.
- Draw inspiration from German cities – through visits and an expert mission.
- Devise a positive scenario for the future and use it to identify measurable targets.
- Draw up a concrete plan of action with a flowchart that is approved by all parties concerned.

The specific time frame has not yet been estimated, and at this point in time this remains difficult.

Developing a climate protection strategy for Nairobi, Kenya



Presenting developed action plans

Kenya is increasingly feeling the impacts of climate change, particularly as its economy is also dependent on climate-sensitive resources such as water and energy for agriculture and tourism. Due to rapid urbanisation Nairobi is now two degrees warmer than its surroundings. 60% of its inhabitants live in informal settlements without adequate sanitation, and in areas that are particularly vulnerable to flooding. The City of Nairobi has already taken a number of measures such as upgrading Luthuli Avenue, restoring parks and public squares, and rehabilitating slums in cooperation with UN-Habitat, the United Nations Human Settlements Programme. Nonetheless there is still no master plan for adapting to climate change that focuses measures, sets priorities and lays down guidance for the various departments involved in urban development. The project therefore aims to kick-start the strategy building process and develop the strategy.

To this end the following initial steps were planned. Citizens will be involved in all steps:

- Describe the problem to the policy- and decision-makers – the Committee on Environment.
- to convince them to develop the strategy.
- Select a mixed interdisciplinary team comprising local and international experts.
- Collect, map, and analyse data.
- Use the data to identify the individual effects on the environment and human coexistence.
- Define and prioritise specific measures.
- Approval of the strategy by the decision-making level.

The specific time frame has not yet been estimated.

Follow-up

Connective Cities will continue to support the implementation of these project ideas according to individual needs and demand, for example through expert missions, study tours, local project workshops, virtual collaborative spaces, webinars, and advice on funding opportunities. The aim will be to develop these ideas until the projects are ready for implementation. To achieve this Connective Cities will liaise continuously with the cities, and where appropriate their German partner cities. Dortmund, for instance, has already been advised by the Service Agency Communities in One World of Engagement Global on funding opportunities that will enable it to continue working with Kumasi.



The tree diagram visualises the Connective Cities learning process.

Excursion to PHOENIX Lake

The conference concluded with an excursion to Lake Phoenix – a mega-project of the City of Dortmund designed to transform a former steel smelter into an artificial lake. With the newly created lake and the restored River Emscher, new green spaces, nature conservation areas, and a water landscape were created,

which form an attractive natural and recreational area for the inhabitants of the neighbouring districts. At the same time, the project implemented measures to protect against the impacts of climate change, such as protection against flooding during heavy rainfall and the improvement of the local climate.



The participants of the Connective Cities Dialogue Event in the Dortmund City Hall

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Connective Cities
International Community of Practice for Sustainable Urban Development
E: info@connective-cities.net
www.connective-cities.net/en/

Connective Cities is a collaborative undertaking involving:

The Association of German Cities
Gereonstraße 18 – 32, 50670 Cologne | Germany
Contact:
Alice Balbo
E: alice.balbo@staedtetag.de

Engagement Global gGmbH/the Service Agency
Communities in One World
Tulpenfeld 7, 53113 Bonn | Germany
Contact:
Alexander Wagner
E: alexander.wagner@engagement-global.de

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
Friedrich-Ebert-Allee 40 | 53113 Bonn | Germany
Contact:
Ricarda Meissner
E: ricarda.meissner@giz.de

Author

Burkhard Vielhaber

Editorial review

Alice Balbo, Alexander Wagner

Design and layout

Fabian Ewert, Visual Communication

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Connective Cities, Martin Magunia, Burkhard Vielhaber

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BMZ offices

Bonn
Dahlmannstraße 4
53113 Bonn
Germany
T: +49 (0)228 99 535-0
F: +49 (0)228 99 535-3500

Berlin
Stresemannstraße 94
10963 Berlin
Germany
T: +49 (0)30 18 535-0
F: +49 (0)30 18 535-2501

poststelle@bmz.bund.de
www.bmz.de