



Organizational learning for resilient cities, through realizing eco-cultural innovations



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ABSTRACT

This article is about cities and climate change, and about ways to make cities more resilient to the effects of climate change. It presents the two dominant strategies of mitigation and adaptation, and goes on to present a systems view on the city in which resilience is the key response to climate change. The article argues that resilience depends on three dimensions or areas: a city's physical form, infrastructure and technology, its people and particular multilevel governance, levels of human connectedness and communal self-reliance, and the innovative capacity as well as the level of inclusion of marginalized groups within the economy. Teaching and training is seen as an important element in strengthening resilience, and the article presents a number of case studies showing the relevance of learning processes as conditions to work successfully in urban networks in the areas mentioned. The article takes organizational learning as its main orientation and presents important concepts such as "reflective action", "learning by doing", "mental maps", the "experiential learning cycle" and the "5 disciplines of the learning organization". This forms the base for the design of concrete educational material. This material is centered on a number of eco-cultural innovations: concrete ideas, technologies, systems or activities that focus on neighborhood-based activities that reinforce the local economy or introduce small-scale technology for water, renewable energy or waste.

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1. Introduction

This article is about cities and climate change and presents the results of the project "Cities, urban governance and climate change: disclosure, training and simulation" carried out in the period of March 2011 until October 2012, with the financial support of the Institute of Science and Technology of Mexico City.¹ The project involved investigators from the Autonomous University of Mexico City, the Research Program on Climate Change of the National University of Mexico (UNAM) and the Department of Energy of the Metropolitan University of Mexico (UAM). The aim of the project was to collect experiences of 25 cities² in dealing with climate change issues, and to disclose the information in such a way that people and organizations working in the same field in other cities,

and more specifically in Mexico City, can benefit from the experiences gained elsewhere. To realize this overall goal the project was organized along the following activities: "monitoring", "disclosure", "analysis" and the "designing of a teaching methodology". The results of the monitoring and disclosure are available on a website³ that was created especially to serve the purpose of this project. The website can best be looked at as an online databank providing information as "raw material" to be used by various persons working in any aspect of cities and climate change. The site now hosts over 250 documents online in the following categories of information:

1. Documents revealing action plans and urban policies on climate as well as reports related to specific urban projects to climate change,
2. Information from networks such as C40, ICLEI and others,
3. Case studies that give a more in depth view in the experiences gained by various cities in dealing especially with governance

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¹ The original names of the project and the institutions involved in Spanish are: "Ciudades y gobernanza urbana ante el cambio climático, divulgación, capacitación y simulación".

² Amsterdam, Barcelona, Bogota, Buenos Aires, Cairo, Mexico City, Copenhagen, Curitiba, Johannesburg, Lima, London, Los Angeles, Madrid, Melbourne, Montevideo, New York, Paris, Rio de Janeiro, Rotterdam, San Francisco, Sao Paulo, Sydney, Singapore, Tokyo, Toronto.

³ See: <http://resilientcities.weebly.com>. The website is bilingual and provides links in Spanish and English, with a majority of links in English.

in networks, small scale ecological innovations and community participatory projects, and

4. Information on educational and artistic programs focusing on climate change.

The analysis centered on the concepts of resilience and multi-level governance and organizational learning and resulted in an educational methodology and program that is designed to be used – in the first instance – within various delegations and communities of Mexico City. This program is based on organizational and experiential learning and aims to teach to collaborate in teams within the context of multilevel governance. A pilot project is in development to be executed in the south of Mexico City, in the delegation of Magdalena-Contreras.

2. Climate change and cities

Most of the documents consulted stress the important and special position of cities with respect to climate change. While cities occupy no more than 2% of the land, metropolitan areas account for 66% of the energy produced and 70% of CO₂ emissions on the planet (World Bank, 2010). The United Nations estimates that the world's urban population will reach more than 60% in 2030 (World Bank, 2010) and assuming that urbanization is a continuous process, we can conclude that the contributions to climate change will be especially considerable in urban areas in the world and will be ever larger in the course of the 21st century (Gay García et al., 2000). Cities are also very vulnerable to the effects of climate change. Over 70% of Europe's largest cities are particularly vulnerable to rising sea levels, as almost all of these cities lie less than 10 m above sea level. Port cities in emerging economies – such as Kolkata, Shanghai, and Guangzhou – are as vulnerable as such cities in developed countries – Rotterdam, Tokyo, or New York City. China alone has more than 78 million people living in vulnerable low elevation cities and this number is increasing annually with 3% (McGranahan et al., 2007). In Latin America the urban growth is particularly important because it has one of the highest rates of urbanization in the world (Cohen and Rai, 2000). Data from the United Nations (UNPD, 2001) indicate that during the period from 1972 to 2000, the percentage of the total population living in urban areas increased from 58.9% to 75.3% and it is expected to become 83% of the total population in 2030, a proportion similar to that found in highly industrialized countries (Rodriguez and Bonilla, 2007).

The responses to climate change we find in most policy documents and action plans mention the two key strategies adopted almost everywhere by now: the strategies of mitigation and adaptation. Mitigation refers to the reduction of the release of greenhouse gases while adaptation refers to responding and reacting to the inevitable changes already taking place (See Box. 1).

Mitigation actions taken in many cities can be divided in various categories. Energy saving in buildings, government offices as well as private houses, is an action frequently mentioned, as well as energy saving through the stimulation of consumer goods that use less energy. The use of renewable energy resources such as wind and solar power, in government buildings, the private sector as well as households, is another option often found in policy documents. Infrastructure (re-) design is applied as well, resulting in greening of buildings and roofs and activities such as rainwater harvesting and the multiple usages of spaces and transportation routes. In many cities transport is an important topic in climate change actions plans, with a variety of specific actions such as stimulating public transportation and the use of fuel-efficient vehicles, investments in public transportation infrastructure and in infrastructure for bicycles or pedestrians. Incentives to reduce the use of private

Box 1. Typical urban mitigation and adaptation actions

Typical mitigation actions:

- Energy saving in buildings
- Stimulating the use of renewable energy resources
- Stimulating public transportation
- Reducing the use of private vehicles
- Infrastructure (re-) design
- Greenhouse gases inventories tracking
- Solid waste diversion
- Green procurement programs.

Typical adaptation actions:

- Hardening of infrastructure to make it more resilient to extreme weather
- Building seawalls to reduce the impact of rising seas and extreme weather
- Improving housing quality to make it more resistant to storm events
- Land filling to raise elevations for new development
- Relocation to alternative settlement areas
- Investment in cooling technologies to improve comfort
- Disaster and evacuation planning based on improved early warning systems

vehicles as well are often applied, such as introducing specific schemes for traffic reduction, utilizing congestion charges and stimulating carpool and vanpool options. Various cities develop and use greenhouse gas inventories that enable them to track emission trends and to develop specific strategies and policies to reduce the emissions of these gases. In many cities solid waste is an integral part of mitigation plans as reducing waste helps to reduce the amount of gases produced in landfills. Various recycling, reuse and conservation programs are being developed, as well as programs for the reduction of packaging and disposable bags. Finally we find green procurement programs that aim to change consumer preferences and stimulate consumers to buy environmentally preferable products and services.

In terms of adaptation, actions depend on specific local circumstances and have in general the objectives to make cities and their economy and infrastructure more resilient to climate change. A lot of attention is given to reinforcement of infrastructure. This may take the form of the construction or reinforcement of seawalls in coastal areas, up to the reinforcement of urban ravines in cities lying in mountainous terrains. In Rotterdam, the Netherlands, floating communities are seen as a serious option for new residential environments. Currently the city is exploring the potentials that these floating constructions may have for the generation of tidal energy, and thus combine adaptation with mitigation targets and objectives.⁴ Improving housing quality to make houses more resistant to extreme events, as well as relocating houses to alternative and more secure areas is another option frequently mentioned. The vulnerability of people is often related with their poverty as the poor often miss the resources to improve their living conditions or to move to more secure areas.⁵ Finally, disaster and evacuation plans, usually in combination with (improved) early warning systems can be found in almost all urban policy and actions plans in the field of climate change.

Even though the two strategies of mitigation and adaptation can be considered as being rather universal, Sanchez-Rodriguez et al. (2008) present an interesting difference in responses between

⁴ See: http://www.rotterdamclimateinitiative.nl/en/100_climate_proof/projects/floating_constructions_and_communities?portfolio_id=53.

⁵ See: <http://www.met.igp.gob.pe/personal/amartinez/aleg3.pdf>.

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