

Mists of the Riachuelo

River Basins and Climate Change in Buenos Aires

by

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The long-standing lack of river basin management policies in Buenos Aires has impacted the development of strategies for facing climate change. This is a highly complex matter in a metropolis that has developed in a context of significant social and environmental inequality. An environmental justice perspective on the institutional changes in the wake of the Supreme Court's rulings in favor of citizens invoking the constitutional right to a healthy environment in the Matanza-Riachuelo Basin illustrates the challenges of environmental management in greater Buenos Aires and the obstacles and opportunities in the development of climate change adaptation policies in the medium term.

El déficit histórico en materia de políticas de gestión hídrica en Buenos Aires ha condicionado las estrategias de adaptación al cambio climático. Se trata de un asunto de alta complejidad en una metrópolis que se ha desarrollado en presencia de fuertes desigualdades sociales y ambientales. Un enfoque de justicia ambiental centrado en los cambios institucionales a partir de la intervención de la Corte Suprema de Justicia en favor de ciudadanos exigiendo su derecho constitucional a la recuperación ambiental de la cuenca Matanza-Riachuelo identifica los desafíos que enfrenta la gestión ambiental metropolitana y las oportunidades y barreras en materia de políticas de adaptación al cambio climático en el mediano plazo.

Keywords: *Climate change, Cities, Environmental governability, Environmental justice*

The Metropolitan Region of Buenos Aires is the most important political center in Argentina and is part of a larger region commonly called the industrial river axis (*eje fluvial industrial*), composed of cities tied together by ports and industries extending from La Plata to Rosario–San Lorenzo, 60 and 300 kilometers from Buenos Aires respectively. As the principal financial center and the hub of production and consumption in Argentina, the metropolis of Buenos Aires possesses 50 percent of the country's labor force and 55 percent of its gross domestic product.

The economic activity of the metropolis provides sustenance for around 15 million people, who make everyday use of its electricity, transport, sanitation,

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and education infrastructures, among others. All of these activities consume natural resources and generate environmental impacts that impact the health of the region's inhabitants. When the state does not intervene in the management and regulation of these forms of resource utilization, human demands on the environment quickly outstrip the regenerative capacity of natural systems, thus producing environmental problems.

Rivers in Buenos Aires are seen as resources to exploit and as dumping sites for all sorts of industrial and household runoff, to the point where they have lost their essential biological characteristics (Herrero and Fernández, 2008; Morello and Matteucci, 2000). The Argentine Supreme Court established a turning point in this process of degradation when, in 2006, it declared that it was competent to hear a case brought by a group of citizens demanding the environmental rehabilitation of the Matanza-Riachuelo Basin, the most notorious example of environmental contamination in all of Argentina. The residents along the river had sued a group of companies for environmental damages and the three governments with shared responsibility in the area—the national government, the provincial government of Buenos Aires, and the autonomous city government of Buenos Aires—for their failure to control the pollution.

In its judgment the court demanded that the companies develop pollution control measures and that the governments act urgently to present an integrated, multistage plan to clean up the river basin. By demanding that the three governments work together, the court placed at center stage the problem of environmental governability in the metropolitan setting. The national state responded to this judicial order by establishing a new interjurisdictional authority, the *Autoridad de la Cuenca Matanza-Riachuelo* (ACUMAR), with management control over the rehabilitation process.

The final sentence from the court about prevention and reversal of environmental damage was issued on July 8, 2008. It established the responsibility of the various jurisdictions in cleaning up the river Basin and identified clear benchmarks to be met by ACUMAR under penalty of personal fines against its functionaries. A local "first instance" court was given the responsibility of monitoring the fulfillment of the sentence, with additional monitoring by an alliance of environmental nongovernmental organizations (NGOs) coordinated by the government's ombudsman, the *Defensoría del Pueblo*. This implementation process is still under way, and the rehabilitation of the Basin is still an uncertain wager that offers several important lines of inquiry.

The Integrated Plan for the Environmental Rehabilitation of the Matanza-Riachuelo Basin, which ACUMAR is implementing, rests upon three clusters of fundamental actions: the conversion and control of polluting industries, the extension of potable water lines, and the rezoning of land (including the relocation of inhabitants living in flood-prone areas). The rehabilitation project has thus become a matter of public debate and a significant challenge for environmental policy: it is a reflection of the problems of environmental degradation of all metropolitan river basins (Cafferatta, 2008; Merlinsky, 2011; Nápoli and García, 2011).

The purpose of this article is to analyze how a historical deficit in river management sets the conditions for defining strategies for adaptation to climate change. This has become a highly complicated matter in a metropolis that has

developed amidst strong social and environmental inequalities. We will consider the heuristic value of the conflict about the cleanup of the Matanza-Riachuelo Basin for a broader analysis of the challenges faced by metropolitan environmental management. Following certain recent proposals in the literature (Garnaud, 2010; Martins and Ferreira, 2010), we will consider this case as a benchmark for identifying opportunities and obstacles regarding medium-term policies for adapting to climate change.

METROPOLIS, BASINS, AND CLIMATE CHANGE

Climate change has a direct impact upon cities in terms of infrastructure as well as population; while these are not exclusively urban impacts, they are keenly felt in cities because of population density (ONU-Habitat, 2011). The recognition of these relationships turns our attention to social interventions to improve the urban environment and to adapt—in other words, to anticipate and plan—responses to climate change in the present and future. The risks and impacts linked to climate change at the local level, as well as the vulnerabilities and adaptive capacities that present themselves, are different in each city. However, some questions have wide applicability across cities: (a) the “domino effect,” in which climate change impacts many other aspects of urban life; (b) social differences in climate change impact, both by neighborhood (and thus by social class) and by individual characteristics of age, gender, race, and ethnicity; and (c) the obstacles to adaptation posed by the lack of appropriate planning, zoning, and construction codes (ONU-Habitat, 2011).

To diminish environmental risks on the local scale, steps can be taken to improve water quality before distribution, to avoid the establishment of industries that pollute or are otherwise prejudicial to health, or to improve traffic management in the interest of air quality. In the context of impacts predicted by global warming, risk reduction is closely tied to the change in the production and consumption models of the highest-income groups, disproportionately located in the developed countries (Satterthwaite, 2008), who are typically responsible for a high percentage of greenhouse gas emissions (Viola and Franchini, 2011). But while the generation of risk is tied to the production and consumption models of the wealthiest classes and countries, the consequences of climate change have a differential impact on the most vulnerable. It is therefore necessary to consider urban policies and strategies, starting with the largest metropolises, which concentrate the largest part of the world’s population. These cities have high-risk areas that represent enormous challenges in reducing vulnerabilities (ONU-Habitat, 2011; Satterthwaite, 2008).

Political and scientific discourse on adaptation and the analysis of these processes on a local scale are a relatively recent phenomenon (Garnaud, 2010; Hodson and Marvin, 2010). A review of the literature carried out by Martins and Ferreira (2010), which included 38 cities on five continents, found that the emphasis in both developed and developing countries was on mitigation. This is in part because measures to reduce the emission of greenhouse gases that have been very visible at the international level, such as energy efficiency, promotion of new technologies, and the overall reduction of the carbon footprint,

have found wide social and economic acceptance. Meanwhile, the will to generate actions to adapt to climate change has been more limited (Garnaud, 2010), and these actions have been seen as add-ons to overall planning; policy makers at the subnational level have not been adequately equipped scientifically, financially, or technologically (Martins and Ferreira, 2010; Satterthwaite, 2008). The prevailing uncertainty as to longer-term risks and impacts and the need to attend to more immediate and urgent demands represent an obstacle to effective mitigation.

Flooding caused by weather events is one of the principal reasons for catastrophes as coastal areas undergo uncontrolled urban growth. For this reason good urban planning and regulation is viewed as one of the most effective means of adaptation (Parry et al., 2008; Vigué and Hallegatte, 2010). Likewise, the relocating of people from high-risk areas, the construction of adequate drainage and sewers, and the use of more permeable paving materials can assist in reducing urban vulnerabilities. One point of agreement in the literature is that direct investments in flood protection and water management infrastructure are among the most effective adaptation measures (Vigué and Hallegatte, 2010: 59).

THE CHALLENGES OF ENVIRONMENTAL REHABILITATION IN THE RIVER BASINS OF METROPOLITAN BUENOS AIRES

River basins are an integral part of one of the most important natural resources on which human beings depend and one of their great preoccupations worldwide: fresh water. Basins are the indispensable spatial unit for evaluating the dynamic and environmental function of natural resources with the goal of conservation and sound management. For this reason, we find that both in the scholarly literature and in concrete environmental policy recommendations, river basins are at the heart of integrated water management (Dourojeanni and Jouravlev, 2002).

The Metropolitan Region of Buenos Aires is located on the bank of the Rio de la Plata, a wide estuary formed by the confluence of the Paraná and Uruguay Rivers; the estuary guarantees the enormous and low-cost availability of fresh water for human consumption. A considerable portion of the metropolitan region is situated between 2.8 and 5 meters above sea level, which puts it at risk of frequent flooding caused by "southeasterlies." These occur because of the geographical situation of the river (which flows from northwest to southeast), such that strong winds and precipitation coming from the southeast raise river levels and generate flooding in lower-lying areas (Bischoff, 2005: 53). Three additional river systems and their respective basins flow into the Rio de la Plata in the metropolitan region: the Matanza-Riachuelo, the Reconquista, and the Luján. Because of unplanned urban development, all of these basins are now seriously degraded.

From the moment of Buenos Aires's founding, its urban expansion has ignored the protection of river basins even though the basins have always been essential to expansion. Industrial uses have been concentrated in lower areas, closer to the river, while residential uses have been farther from it and higher.

Industrial uses have been privileged at the expense of others of a more social and environmental nature, thus externalizing the real costs onto the population. More recent phenomena such as expressways and gated communities have continued the tradition of ignoring water conservation. Traditionally agricultural areas and wetlands have been occupied, and the landscape has been profoundly modified. This has altered the drainage of surrounding areas and has produced an impact on people living outside of the new construction (Daniele et al., 2006).

In addition, the metropolitan area has expanded in a way that reproduces profound territorial and social inequalities. Outlying municipalities, especially in the south and in the lower basins of the Reconquista and Matanza-Riachuelo, have suffered long-standing deficits in land use planning, infrastructure investment, and provision of water and sanitation (Clichevsky, 2002; Torres, 2001). These municipalities have the smallest budgets and face the most serious consequences of environmental degradation.

Thirdly, there has been a decades-long vacuum of public policy for urban land use in poor neighborhoods. The metropolis has expanded via two dynamics, one market-based and highly organized, oriented toward the upper and upper-middle classes, and the other outside the market, whereby people of more limited resources acquire land lacking in economic value (Cravino, del Rio, and Duarte, 2008). These areas tend to be in floodplains, often with contaminated soil or even open trash dumping. Fully half of the population residing in informal settlements and the poorest neighborhoods, some 500,000 persons (many of whom are in floodplains), resides in the lower Matanza-Riachuelo Basin (Merlinsky et al., 2012).

Lastly, there has been a lack of metropolitan coordination about key aspects such as the cumulative impact of large-scale infrastructure projects, the integrated management of municipal solid waste, and the provision of water and sewers (Fundación Metropolitana, 2005; Nápoli and García, 2011). The design of a new body for basin management is located within this vacuum of metropolitan policy making. The last experience of environmental rehabilitation of the Matanza-Riachuelo Basin, the “thousand-day plan” promised by Secretary of the Environment María Julia Alsogaray, was consigned to popular memory as a mere slogan, an official promise left unfulfilled (Merlinsky, 2013).

THE MATANZA-RIACHUELO BASIN: THE BENCHMARK CASE

Over 8 million people live in the Matanza-Riachuelo Basin, which makes up the southern part of Buenos Aires proper and 14 adjacent municipalities. Environmental authority is divided between the national government, the provincial government of Buenos Aires, and the city government, which enjoys provincial status—the first because of the river’s status as navigable waterway, the others because control of natural resources rests at the provincial level. The historical process of the deterioration of the basin is the consequence of the conflict between opposing interests in the social appropriation of nature. This deterioration is the result of various long-standing social, economic, and environmental problems.

The first problem is the deficit in sanitary infrastructure coverage. Around 30 percent of homes in the basin lack a potable water connection, and 57 percent lack sewer hookups. This generates ground and water contamination from sewage infiltration. A 2009 study estimated that 53 percent of homes in the basin suffered from sanitary vulnerabilities. The coverage deficit greatly increases susceptibility to diarrhea, hepatitis, cholera, and other illnesses (ACUMAR, 2010; AySA, 2009).

The second problem is pollution by industries that dump their waste without permission or that exceed permitted amounts based on the basin's carrying capacity. During 2012 ACUMAR conducted a survey of enterprises in the basin and found more than 20,000, of which 11,000 were manufacturers and 1,400 of these were declared "polluting agents" (ACUMAR, 2012). While industrial pollution represents only a small share of overall pollution by volume, its contents are the most dangerous, including highly toxic heavy metals such as lead, mercury, and zinc.

The third is the high concentration of illegal open-air garbage dumps, mostly located along the banks of the river. During 2012 360 of these dumps were closed. These sites provide employment to many informal workers who recycle the contents, an activity that subjects them to significant health risks (Cuerpo Colegiado, 2009).

The fourth problem is the location of highly polluting industries alongside residential areas, in the absence of any zoning restrictions. This is the case, for example in the municipality of Lanús, where the leather industry dumps its untreated waste into the river, imperiling the health of the surrounding residents (Cuerpo Colegiado, 2009).

Fifth, the highest levels of environmental degradation exist in the lower part of the basin, where we find the highest concentration of people in informal neighborhoods and slums: some 300,000 people, with densities as high as 664 per square kilometer (Merlinsky et al., 2012). Those living nearest to the river and its feeders or to the most polluted industrial concentrations are at the highest risk of environmentally related illnesses (Ferrer, 2011).

Sixth on our list is the existence of a zone of "technological risk." The Polo Petroquímico Dock Sud, an industrial complex of some 380 hectares and 42 firms, sits at the mouth of the Riachuelo. Several reports (AGN, 2010; Defensoría del Pueblo de la Nación, 2006; JICA II, 2003) have noted the heavy presence of flammable chemicals and their associated risks in this area. Thirteen hundred families live adjacent to the complex in a neighborhood appropriately known as Villa Inflamable.

One important consequence of the fusion of social and environmental inequality is the accumulated impact of multiple risks at certain critical points called "hyperperipheries" (Torres and Marques, 2001). These areas have extreme levels of flood risk, environmental contamination, and insufficient public services. These peripheries-within-peripheries have the highest population growth, accentuating their deficit in public services. The population in slums and informal settlements increased by 220 percent between 1981 and 2006 versus only 35 percent overall (AySA, 2009: 41). More than half of this population resides in the lower part of the basin, the nexus of social and environmental inequality. This leads us to consider environmental injustice as a mechanism that is reproduced

as a structural absence: the absence of income and property and the absence of opportunities to secure an adequate job or adequate housing (or choice of neighborhood). Living in a polluted environment generates health impacts that are reflected in life expectancy and morbidity/mortality rates, the ultimate limit to the development of self-determination.

ENVIRONMENTAL REHABILITATION AND ADAPTATION IN THE LANGUAGE OF RIGHTS

The demand for the cleanup of the Matanza-Riachuelo Basin has brought to center stage the *collective character of the right to a healthy environment* (Articles 41 and 43 of the constitution), understood as an intergenerational human right. In these terms, the cleanup of the basin is a means to repair damage to the health of local residents (Ley General del Ambiente 25.675, 2002: Articles 27, 28 and 30). To this end, the Supreme Court has sought to generate institutional spaces to resolve the problem, proposing an experience-based model that demands coordinated action and consistent monitoring. The court has organized public meetings to evaluate the state of the environmental cleanup plan, and ACUMAR must report to the court about results, timelines, and financial goals. One of the most important consequences has been the creation of a new line item for environmental programs in municipal budgets. While the judicial process has not brought down all of the structural and political barriers to the rehabilitation of the Matanza-Riachuelo Basin, the process over the past six years has produced significant institutional and social effects. For the first time in history, there is an entity with real power to coordinate and execute basin policies.

In social terms, the most important result of this process has been the elevation of the environmental question to the level of public concern and policy. Environmental problems now figure in the demands of social organizations, and this has permitted a reevaluation of natural resources, starting with water, which are now seen as common goods that must be protected against current and future threats.

BASIN MANAGEMENT AND CLIMATE CHANGE ADAPTATION POLICIES

The Metropolitan Region of Buenos Aires has a high level of exposure to climate risks deriving from increased precipitation. Studies published over the past decade have noted the likelihood of increased flooding throughout the Rio de la Plata Basin (Barros, Doyle, and Camilloni, 2008: 117; Barros, Menéndez, and Nagy, 2005). Unplanned urbanization, including street paving and the elimination of green space, has reduced the absorptive capacity of the land, leading to increased runoff. The situation is aggravated by the obsolescence and lack of maintenance of the drainage network, especially the storm drains through which rainwater enters the network, and the lack of planning standards for floodplains (Herzer and Clichevsky, 2001).

Although the greatest variation in river levels is caused by wind and the waves it generates, a permanent climate-related change is predicted over the course of the twenty-first century. The predicted increase of 0.50 to 1 meter in sea levels does not mean that the riverbanks of the Buenos Aires region will be permanently flooded; rather, their vulnerability to storms and their southeasterly winds will be exacerbated (Barros, Menéndez, and Nagy, 2005). The most highly impacted areas will be the lower basins of the Reconquista and the Matanza-Riachuelo, which, as we have seen, have a high concentration of vulnerable population.

OPPORTUNITIES AND OBSTACLES TO CLIMATE CHANGE ADAPTATION IN THE MATANZA-RIACHUELO BASIN

An accurate and fine-grained estimate of urban environmental risks requires the development and implementation of four principal lines of public policy: research and information, infrastructure investment, social protection, and institution building (Garnaud, 2010; Martins and Ferreira, 2010; PNUD, 2007–2008). With respect to the first, accurate risk evaluation is indispensable to any climate change adaptation strategy. Meteorological information systems are an essential aspect of infrastructure planning, agricultural policy, and disaster management. Cities and countries must invest much more in understanding how their ecosystems function by maintaining a network of environmental information and by developing appropriate university programs.

The conflict over the cleanup of the Riachuelo represents an opportunity in this regard. The court has mandated a system of public information to track the cleanup results; it has promoted the adoption of a system of indicators to determine the pace of progress toward the final goals, and it has called for periodic studies on water quality monitoring. Although progress has been mixed on these three points, overall they represent an effort to generate a common knowledge base for public deliberations about regional environmental management and its political challenges.

The idea that climate change is not urgent and that we should wait to “see its impact” before taking action is one of the principal barriers to taking appropriate measures (Garnaud, 2010); for this reason, the court’s emphasis on environmental information systems and their strategic role in identifying the factors of environmental change is highly significant. It sets up a research and dissemination program that will permit long-term studies on the evolution of natural systems and the monitoring of shorter-term factors and processes linked to land use.

As for the second point, infrastructure investment, for decades the disaster management literature has pointed out that postdisaster damage is inversely proportional to pre-disaster infrastructure investment. This investment is broadly defined to include both human (health, education, housing) and physical infrastructure (such as buildings). Since the population most vulnerable to the adverse impacts of climate change is also the most vulnerable to other large-scale changes that have made their impact felt in recent years, infrastructure

investment (again, broadly defined) not only reduces future risks but also provides concrete commitment to social justice in the present.

In the Buenos Aires metropolitan area around 3 million people do not have potable water and 6 million lack sewer service. To deal with this deficit the state-owned Aguas y Saneamientos Argentinos S.A. (AySA) has designed a master plan to extend the networks to all inhabitants by 2020. The greatest deficit is in the municipalities of the lower Matanza-Riachuelo Basin, where in some places (such as Lomas de Zamora and Almirant Brown) the sewer deficit is around 70 percent. The extension of sanitary infrastructure would create a virtuous circle, improving natural water flows and reducing risk factors for human health. The legal case has resulted in accelerated time frames for infrastructure completion and guaranteed spending detached from the electoral calendar. Nevertheless, it is necessary to provide shorter-term solutions for the at-risk population, since even the accelerated timeline will require several years—and that is without any financial crises.

The social protection policies are the lever that guarantees distributive justice in adaptation policies. This includes insurance (cash transfers to victims of disasters), which has two important effects: it permits populations impacted by disasters to maintain their productive capacity and to sustain their investments and avoids the diversion of resources previously committed to other important goals. The financial needs of adaptation must be understood as new and additional; in other words, they must supplement and not displace existing commitments to social protection.

This represents a special challenge in countries like those of the Southern Cone, with a history of sacrificing general social protection spending for specific “focused” programs. In Argentina in recent years there has been a return to more general spending, but climate change is a new challenge to this conception. For instance, one of the critical aspects of the implementation of the court’s sentence has been the lack of details about housing, since a significant part of the population living along the banks of the Riachuelo must be relocated because of flood risk and as a way to guarantee public space along the river. This leads to an enormously complex problem, the lack of an overall land use policy on social housing.

Regarding institution building, we have seen that until recently planning for adaptation has been a marginalized activity in most developing countries and those countries that have implemented adaptation strategies have focused on physical infrastructure. While this is crucial, adaptation is much more than infrastructure. The starting point is the integration of climate-change-related risk evaluation into all aspects of public policy planning (PNUD, 2007–2008: 174). The principal result of the Matanza-Riachuelo case presented here has been the creation of ACUMAR, which has the legal capacity to act throughout the basin region. While this in itself has not been sufficient to guarantee the implementation of a cleanup plan that fulfills the requirements and timelines imposed by the court, the emergence of this new institutional actor opens a window of opportunity for collective action by environmental groups and contributed to the development of a new agenda for environmental policy in the metropolitan region.

CONCLUSIONS

The conflict over the cleanup of the Matanza-Riachuelo Basin eloquently expresses the complexity of environmental problems and the interrelation of local, regional, and national scales in dealing with large-scale challenges. Environmental policy challenges interjurisdictional management because the geography of natural resources typically does not respect the political borders between municipalities, provinces, and countries.

That the Riachuelo conflict has become visible is because the court's sentence has made it a political matter processed through legal means. In the law this is known as a "structural" case, one in which the court cannot issue a simple order to resolve a problem because the origin of the violation of rights lies in systemic policies and practices. The demand to clean up the Riachuelo required the modification of institutional designs, division of jurisdictional powers, and regulation of economic activities. In short, it was necessary to destabilize a model of state intervention that has been functional to the status quo in order to guarantee the exercise of the right to a healthy environment. In this regard the court's sentence constituted a medium-term institutional reform that was also necessary to adapt to climate change.

My goal in this article has been to demonstrate the existence of historical deficits in environmental policy in the Buenos Aires metropolitan area and the obstacles they have presented to adaptation to climate change. I have sought to show that the legal case has produced a window of opportunity by establishing the right to a healthy environment as a tool in the hands of the plaintiffs on behalf of society. The political dimensions of the decisions taken thus far about mitigation and adaptation raise three fundamental questions: who should pay, how to estimate future consequences, and how to establish criteria based on justice in determining priorities.

This leads us to pose the problem in terms of environmental justice, a claim that has been central to the identification of priorities arising from the court decision. There is a disconnect between a long-term strategy based on all areas of environmental risk and a short-term strategy focusing solely on the riverbanks: the former implies a broad agenda that ties the right to a healthy environment to the right to adequate housing, while the latter improves the landscape of the river, generates public space, and perhaps even increases land values but does not address fundamental social and environmental inequalities.

Adaptation is (as noted by Garnaud, 2010) not a finite process but a process of becoming. In Buenos Aires as in other cities and countries, adaptation initiatives and processes are still in the test stage and their successes and failures are still puzzles to be solved. The Riachuelo conflict represents an opportunity to understand and act upon the overall problem of social vulnerability in areas of environmental risk. If we want to get ahead of consequences in the future, it is because we see warning signs in the present. Ignoring them, as Luhmann (1998: 242) notes, will not protect us from those consequences and in itself is a form of decision.

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