



Participatory democracy and sustainable development: integrated urban environmental management in Porto Alegre, Brazil

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1. See, for instance, Viero, Odete Maria with the collaboration of Andre Passos Cordeiro (2002), *Public Interest vs. Profits: The Case of Water Supply and Sewage in Porto Alegre*, which lists the various quality of life or human development indices in which Porto Alegre comes top, paper prepared for WaterAid, 24 pages.

SUMMARY: Porto Alegre is well known for its innovative social policies but less so for the environmental policies that are this paper's focus. The paper begins by describing the city's participatory budgeting system and the multiple interconnections it has with a wide-ranging environmental policy. Porto Alegre has the highest standard of living and the highest life expectancy of any Brazilian metropolitan centre. Virtually all its people have water piped to their homes and most have good-quality sanitation and drainage. The garbage collection system reaches virtually all households and has included a separate collection of recyclables since 1990; other programmes enforce industrial pollution control (including special provision in garages and petrol stations), keep down polluting motor vehicle emissions and ensure the re-utilization of organic wastes from parks and restaurants. The city has 14 square metres of green space per person and a million trees along its streets. This paper also describes the education and environmental information programme that underpins these policies, including changes to school curricula and the Environmental Atlas of Porto Alegre that provides the base information for environmental policy, environmental discussion and environmental education. The paper ends by discussing how sustainable development is impossible without good urban environmental management and how this, in turn, has to be built on democracy and participation.

I. INTRODUCTION

PORTO ALEGRE IS the capital city of Brazil's southernmost state, Rio Grande do Sul. Since 1996, it has consistently had the highest standards of living of all Brazilian metropolitan areas.⁽¹⁾ In the context of the crisis currently afflicting so many low- and middle-income nations, and increasing levels of poverty, unemployment and corruption in large South American cities, Porto Alegre's progress is inextricably linked to the way in which the city has been managed over the last 12 years. The last four mayoral terms in Porto Alegre's municipal government have been coined 'popular administration' (*administração popular*). The key characteristics of popular administration include the adoption of techniques for participatory democracy, a high level of citizen involvement in allocating the municipal budget, the reorientation of public priorities by citizens, the integration of public environmental management policies and the regeneration of public spaces.

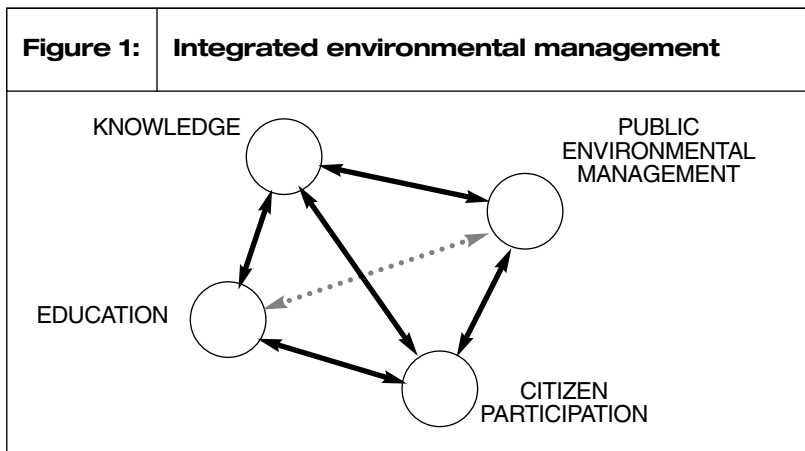
The most important and widely publicized technique for participatory

democracy is participatory budgeting, initiated in 1989 under the mayoral term of Olívio Dutra (1989–1992) and continued under the administrations of Tarso Genro (1993–1996 and 2001–2004) and Raul Pont (1997–2000). Participatory budgeting has completely reversed the traditional patronage approach that characterizes public administration in most Brazilian cities. In 2000, the participatory budgeting process involved approximately 30,000 citizens, thus ensuring that public interventions corresponded with the priorities of the population.

The principal aim of this paper is to present the unique system of integrated environmental management adopted in Porto Alegre. The system is based on four interrelated components (Figure 1):

- citizen participation;
- public environmental management programmes;
- comprehensive knowledge of Porto Alegre’s natural and built environments; and
- environmental education.

The underlying premise is that programmes and activities implemented within each component should also consider the principles of the other components in order to enhance their own effectiveness and to benefit from integration with the other components.⁽²⁾



Once citizens had become involved in decision making for the municipal budget, it was recognized that urban planning and management – in particular environmental management – also needed to be fundamentally revised. It was clear that a purely physical planning model that operated in isolation from the key actors was now incompatible with participatory democracy. Therefore, the planning authority also needed to adopt democratic decision-making processes, whether in its relations with other government bodies, other institutions or, most importantly, with citizens. In order to involve different actors, the need was identified for a system of knowledge and information of the urban and natural environments that was accessible to all actors: physical planners, politicians, institutions and citizens. The production of this knowledge itself required fundamental changes in the way information was collected, compiled and validated. School education also underwent important changes, which included democratizing both the administrative structure and the process of curriculum definition and modifying teaching methods to place greater emphasis on the pupils’ own context.

2. Menegat, R (2000), “Educação ambiental integrada: o exemplo do atlas ambiental de Porto Alegre” in Azevedo, J C, P Gentili, A Krug and C Simon (compilers), *Utopia e democracia na educação cidadã*, Edufrgs, Porto Alegre, pages 507–520.

This paper presents the features of each component of the integrated environmental management system (see Figure 1). The rest of this section outlines the physical environment of Porto Alegre in relation to the South American context and describes the nature of municipal public administration in Brazil. The second section describes the provisions made for public participation and outlines the principles of participatory budgeting and other tools for participatory democracy. The third and fourth sections describe the main public environmental management programmes and their outcomes. Section V describes the production and use of the *Environmental Atlas of Porto Alegre*, which provides the city with a tool for environmental management and environmental education unprecedented in Latin America. Section VI discusses the use of local environmental knowledge as the basis not only for environmental education but also as a foundation for democratic decision making and sustainable development. The final section reflects on what general lessons can be drawn from Porto Alegre's experiences.

a. The physical landscape: a convergence of ecosystems

Located in southern Brazil (Map 1), the Porto Alegre region is surrounded by four geomorphological features. To the north is a plateau (*planalto meridional*), with a steep escarpment intersected by ravines and altitudes of up to 1,298 metres. To the south, the highlands of the Rio Grande do Sul Shield (*planalto do Escudo Sul-Rio-Grandense*) has diverse relief formations and heights of up to 599 metres. Between these two highland regions, a narrow fluvial plain (*depressão periférica*) extends westwards to the Gran Chaco of Bolivia and Paraguay to the north and the Argentine Pampas to the south. To the east is the South Atlantic coastal province (*provincia costeira*), formed by an extensive sand barrier enclosing the world's largest lagoon and containing numerous lakes, among them Lake Guaíba, which borders Porto Alegre to the east.



Seven ecological regions in the Southern Cone have influenced the flora and fauna of the Porto Alegre region: to the north the Atlantic forest and the Araucaria forest; to the west the Paraguayan Chaco, the Argentine Pampas and the Andean foothills; to the south the Uruguay and Rio Grande do Sul savannah; and to the east the sand barrier of the coastal plain. The Porto Alegre region is therefore a zone of convergence of several major ecosystems and consequently an area of rich biodiversity. The region's natural history has been studied in depth, compiled and published as the *Environmental Atlas of Porto Alegre*.⁽³⁾

Porto Alegre itself has a population of 1.3 million inhabitants. It covers an area of 470 square kilometres, 40 per cent of which is urban and 60 per cent rural. Porto Alegre and 14 other municipalities make up the wider metropolitan area, which has a population of approximately 3.5 million.

b. The context of outdated municipal government in Brazil

The increasingly significant role of municipal governments in public administration in Brazil is fairly recent. Over the last few decades, more than 5,500 municipalities have taken over policy areas that were previously managed only at the state or federal level, such as health, environment, education and, most recently, policing.⁽⁴⁾ The decentralization of these responsibilities was partly a result of the new federal constitution in 1988, and also due to the significance of social and popular movements that led to the reinstatement of democracy in 1984 after 20 years of military dictatorship.

Although the 1988 constitution introduced mechanisms for citizen participation in public administration, virtually no local or state government made use of these, and the political framework continued to be top-down and based on the traditional patron-client relationship. In the words of the former mayor of Porto Alegre, Raul Pont:

"The Brazilian political culture was based on the ideology promoted and practiced by the elite, one which was strongly characterized by patronage, oppression and a lack of recognition for the value of work. Even Brazil's transition to a republic [1889] failed to curb the propensity of the ruling classes for using the state and public authority simply as a means of accumulating wealth."⁽⁵⁾

Over the last four years, the 1988 constitution's potential for decentralization has been effectively disregarded, for two reasons. First, the excessive use of provisional measures by central government has reduced the autonomy of the legislature. Second, the continuing decrease in federal revenue transfers to the local level has weakened municipal governments' capacity for local investment at a time when housing, sanitation and transport policies in Brazilian cities have already broken down (Table 1). To make matters worse, the federal government has also transferred responsibility to the state and local levels for certain areas of public policy such as health, traffic management and public transport, urban drainage and low-cost housing.⁽⁶⁾

The combination of a growing social crisis, increased responsibilities for local governments, a shortage of resources, the energy crisis⁽⁷⁾ and the outdated nature of traditional urban and environmental planning and management has culminated in a situation of social disintegration, breakdown and incivility in Brazilian cities without precedent in the country's history as a republic.⁽⁸⁾ This is illustrated by the increase in urban violence and organized crime, which results in 45,000 annual fatalities.⁽⁹⁾

3. Menegat, R, M L Porto, C C Carraro and L A D Fernandes (coordinators) (1998), *Atlas ambiental de Porto Alegre*, Edufrgs, Porto Alegre; also (1999) *Environmental Atlas of Porto Alegre*, condensed version, Edufrgs, Porto Alegre.

4. Alonso, J A F (1993), "A inserção de Porto Alegre na nova ordem internacional e o enfrentamento ao problema social local" in Genro, T (coordinator), *Porto da cidadania*, Artes e Ofícios, Porto Alegre, pages 1-81.

5. Pont, R (2000), "Porto Alegre e a luta pela democracia, igualdade e qualidade de vida" in Pont, R (coordinator) and A Barcelos (organiser), *Porto Alegre, uma cidade que conquista*, Artes e Ofícios, Porto Alegre, pages 11-27; citation from page 11.

6. See reference 5.

7. Brazil's energy crisis: in June 2001, the Brazilian government announced six months of emergency electricity rationing. Companies and the general public were ordered to reduce their electricity consumption by 20 per cent or face blackouts. This was due to a persistent drought and low river levels, which reduced Brazil's capacity to generate hydroelectric power, from which it derives 90 per cent of its energy needs (Source: *New York Times*, 6 June 2001).

8. Menegat, M (2001), *Depois do fim do mundo: a crise da modernidade e a barbárie*, PhD thesis, Federal University of Rio de Janeiro, Rio de Janeiro.

9. Grillo, C (2000), *Assassinato cresce mais que população*, Folha de São Paulo, March.

Table 1: Government disposable income from taxation after federal transfers, illustrating municipal government's decreasing capacity for investment			
Year	Gross tax revenue (%)		
	Federal	State	Municipal
1996	56.17	27.65	16.18
1997	57.58	26.64	15.78
1998	59.80	25.21	14.99
1999	62.30	23.61	14.09

SOURCE: Pont, R (2000), "Porto Alegre e a luta pela democracia, igualdade e qualidade de vida" in Pont, R (coordinator) and A Barcelos (organizer), *Porto Alegre, uma cidade que conquista*, Artes e Ofícios, Porto Alegre, pages 11–27.

II. PARTICIPATORY BUDGETING: DECISION MAKING IN THE HANDS OF CITIZENS

IN PORTO ALEGRE, direct citizen participation in decision making has been introduced in various ways, the best known and most important of which is participatory budgeting. Participatory budgeting is defined as a 'civil, not state, form of governance' and its introduction in 1989 marked the beginning of a significant experience with real participatory democracy.

Although there is a municipal government authority responsible for participatory budgeting, the Department of Community Relations, the process is accepted as an autonomous form of public participation. It is based on a number of fora in which citizens are able to control and guide the municipal government and its spending. Communities participate in assemblies organized by geographical district and sectoral theme to determine their needs and priorities. In addition to defining the municipal budget, communities also manage the implementation and timing of public interventions.

When both the communities' district and sectoral priorities and the government's own requirements have been established, a proposal is drawn up to be discussed with the participatory budgeting council. Once approved, the budget proposal is sent to the city councillors. In the meantime, the participatory budgeting council and the municipal government begin drawing up the expenditure plan based on the budget proposals. The expenditure plan sets out all the public works to be carried out in each district for that year, and which government authorities are responsible for their execution, and this is printed and distributed to the public. Since 1989, the priorities defined by the district public assemblies have been sanitation, land tenure regularization and street paving, with land tenure still at the top of the agenda, along with housing, in 1997.

a. Participatory budgeting: structure and process

Participatory democracy and district development: the district public assemblies

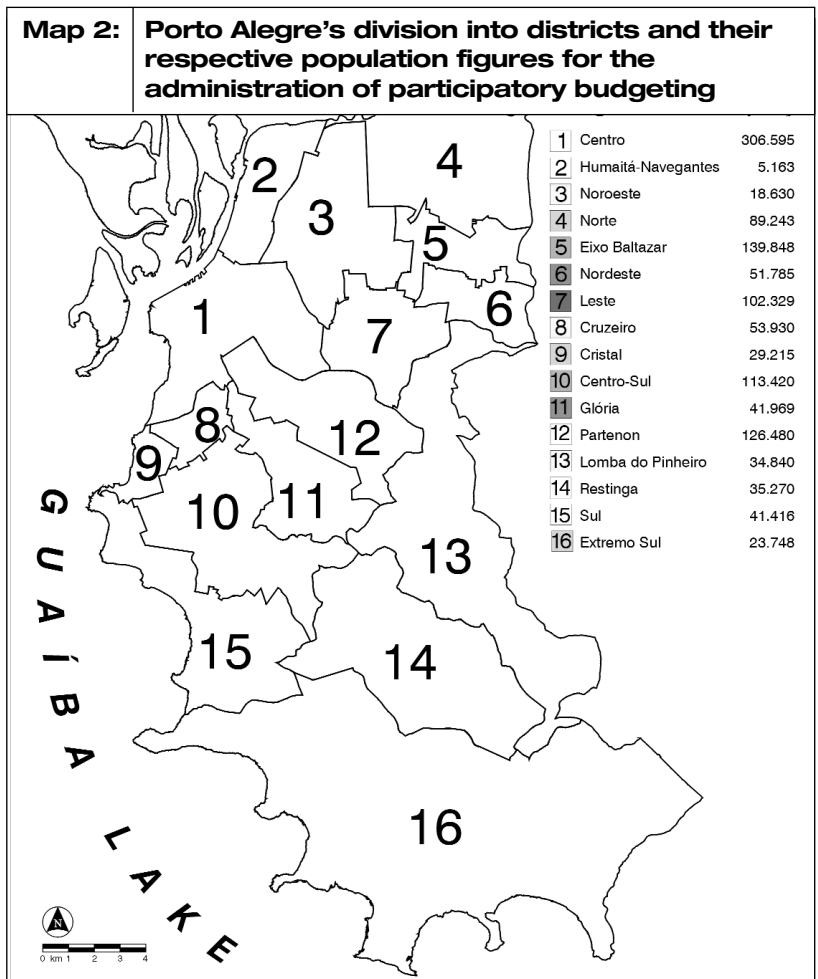
The municipality is sub-divided into 16 districts based on geographical and social criteria and existing community organization (Map 2). Each district

acts as a unit for the distribution of resources and is allocated a budget quota in proportion to its population size. The sectoral priorities for each district (basic sanitation, housing, street paving, education, social welfare, green areas, health, traffic and transport, sport and recreation, street lighting, economic development and culture) and their respective public interventions are defined at district public assemblies. The municipal government participates in the whole process, providing technical information and presenting its own requirements, which are generally interventions and priorities of a city-wide nature. It also uses the assemblies to account publicly for its management of the city and budget expenditure.

Each district also elects representatives (delegates) to form the groups that participate in the various decision-making stages of the participatory budgeting process:

- the forum of district delegates;
- the forum of sectoral delegates;
- the district popular councils; and
- the participatory budgeting council.

The participatory budgeting council is responsible for establishing the general criteria for allocating the budget among the districts and for overseeing the implementation of public interventions.



Participatory democracy and sectoral planning: the sectoral plenary assemblies

As part of the extensive restructuring of participatory budgeting in 1994, sectoral public assemblies were introduced to give citizens the opportunity to discuss specific issues relevant to the city. Discussion forums were set up around five sectoral themes:

- urban planning and development, sub-divided into environment and sanitation, and city planning and housing;
- traffic management and public transport;
- health and social welfare;
- education, culture and recreation; and
- economic development and taxation.

For each discussion theme, the plenary assemblies enable citizens to discuss the city's strategic planning and sectoral policies in greater depth. Representatives are also elected at the sectoral plenary assemblies to participate in the participatory budgeting council and the forums of district and sectoral delegates.

Participatory democracy and strategic planning: the city conferences

The ongoing implementation of participatory budgeting also led to significant changes in the city's culture of urban management. Whilst local issues raised by the public were put on the city's agenda, issues of a city-wide nature were neglected. In order to acknowledge and integrate these issues, a sequence of 'city conferences' was launched in 1993.

The city conferences brought together representatives from civil society, identified by various means including the participatory budgeting initiative. In the first city conference, 'Porto Alegre: City of Democracy',⁽¹⁰⁾ 1,500 participants and 548 representatives debated the central question: 'What kind of city do we want for the future?' The participants were divided into four large groups around the following themes:

- economic development;
- urban regeneration and development;
- traffic management and public transport; and
- the city's financing.

The principal conclusions from the conference were synthesized in the form of policy recommendations, which advised that the future Porto Alegre should:

- practise democratic and decentralized urban management;
- combat inequality and social exclusion;
- promote high standards of living and environmental quality;
- be culturally rich and diverse, attractive and competitive;
- seek to establish partnerships between the public and private sectors;
- adopt effective financial strategies; and
- assume its responsibility as the focal point of the metropolitan area.

In the second city conference, 'Porto Alegre: City for All', in 1995, 2,700 participants and 331 delegates debated the reformulation of the urban development master plan, which now included environmental issues. Building on the policy recommendations of the first conference, the participants formed four working groups:

- district plans;
- planning and management systems;
- urban development, sub-divided into: capacity for more concentrated

10. Prefeitura Municipal de Porto Alegre (1993), *Diretrizes para Porto Alegre [resoluções do I congresso – Porto Alegre mais, cidade constituinte]*, Prefeitura Municipal de Porto Alegre, Porto Alegre.

urban development, traffic management and public transport, polycentricity (decentralized concentration) and land-use zoning;

- environmental heritage; and
- housing policy.⁽¹¹⁾

The conference produced a set of resolutions that formed the basis of the new urban and environmental development master plan, which was approved by the city councillors in 1999 following lengthy discussions.

The third city conference in 2000, 'Building the City of the Future',⁽¹²⁾ was held in two stages. In the first, approximately 7,000 people attended numerous meetings, plenary assemblies, symposia and conferences on specific themes. These included the 'Second Municipal Conference on Education', the 'Municipal Conference on Health', the 'First Municipal Conference on Tourism' and the 'Municipal Conference on Human Rights'. In the second stage, 1,780 citizens sought to synthesize the city's social and strategic policies by deliberating the policy recommendations on five themes:

- social policy;
- culture, tourism, sport and recreation;
- urban and environmental development;
- economic development; and
- general issues.

The conference coincided with the four-yearly planning exercise which, until then, had been undertaken only by municipal planners and technical staff. For the first time, the 2000 plan involved the general public in setting targets for the next long term.

Stages and process

The process of discussion and decision making follows an annual cycle of two main stages (Figure 2): first, defining priorities and proposals for public spending in plenary assemblies, in which all citizens can participate; and second, drawing up the budget proposal and expenditure plan, in which the priorities and proposals approved by the citizens should be sufficiently developed for submission to the state legislature as the municipal budget. The budget proposal and expenditure plan should also be technically sound enough to be converted into an expenditure plan detailing the works and services to be undertaken by the municipal secretariats and departments. The whole process is overseen by the municipal government and representatives elected through the participatory budgeting process, namely the participatory budgeting council and the forums of district and sectoral delegates.

The first stage consists of two large rounds of general and sectoral plenary assemblies (Figure 3). Citizens can participate in all events, at which they have the opportunity to present their requests and proposals for the annual municipal budget destined for their district or for a certain sector. Between the two rounds is an interim phase, which consists of numerous more specific meetings based on each of the 16 districts and five themes and their respective sub-divisions. These meetings are coordinated and facilitated by the delegates elected to the district and sectoral assemblies and allow the communities to discuss in greater depth their needs and priorities, which will be decided during the second round of assemblies.

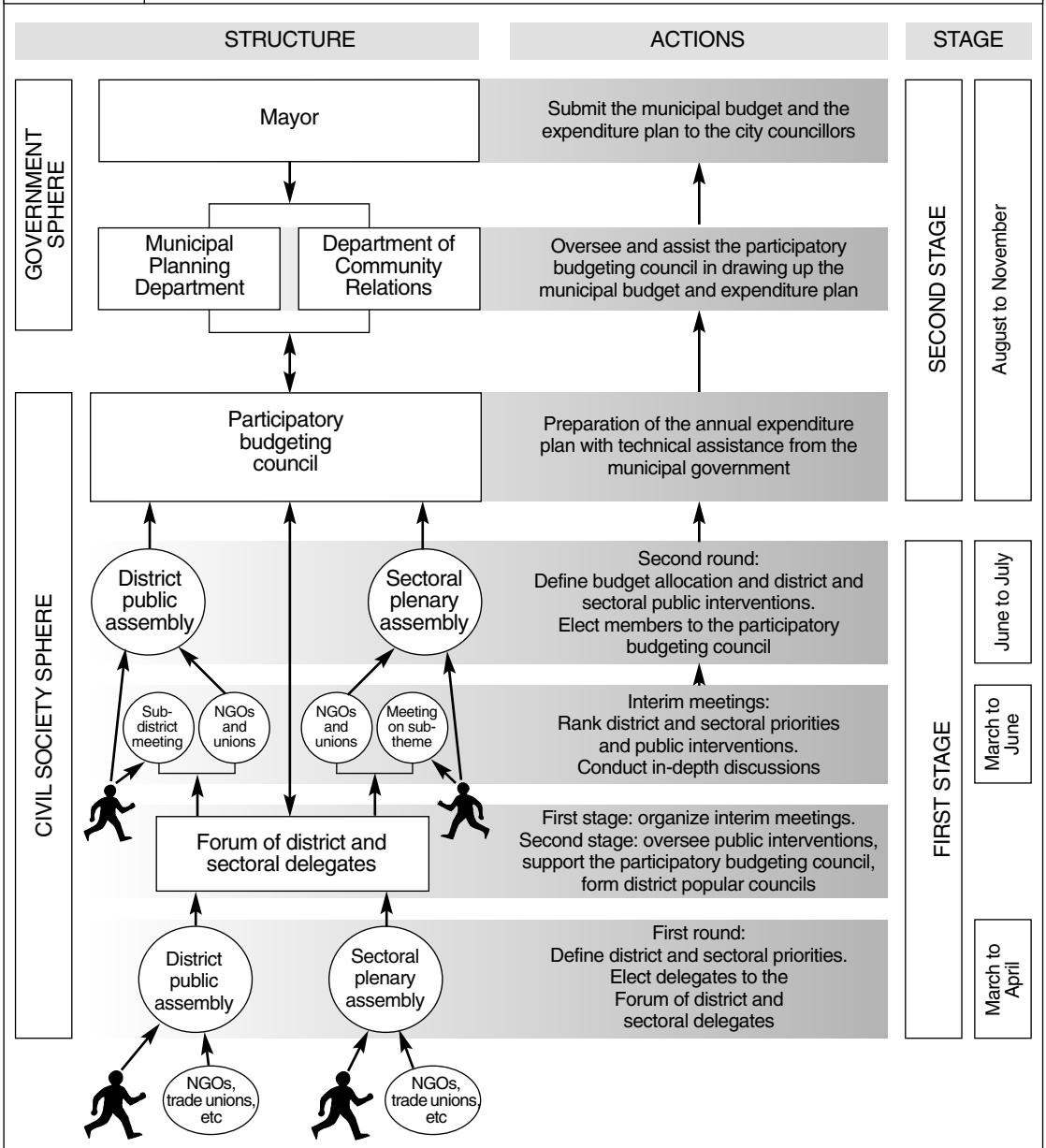
The second round is coordinated by the participatory budgeting council, made up of councillors as follows:

- two members and two deputies from each of the 16 districts;
- two members and two deputies from each of the five sectoral forums;

11. Prefeitura Municipal de Porto Alegre (1995), *II congresso da cidade: o lugar de todas as coisas; resoluções*, Prefeitura Municipal de Porto Alegre, Porto Alegre.

12. Prefeitura Municipal de Porto Alegre (2000), *III congresso da cidade: construindo a cidade do futuro; resoluções*, Prefeitura Municipal de Porto Alegre, Porto Alegre.

Figure 2: Structures, stages and timescale in the participatory budgeting process



- one member and one deputy from the Porto Alegre Municipal Workers Union;
- one member and one deputy from the Union of Porto Alegre Residents' Associations; and
- two representatives from the municipal government, but without the right to vote.

The councillors' term of office is one year and re-election is permitted for one further consecutive term. A councillor's term can be revoked at any time by the fora of district and sectoral delegates, which can also

approve the substitution of a councillor when this decision is backed by at least two-thirds of its members.

The district and sectoral delegates, who number more than participatory budgeting council members, have an important role in the second round of assemblies. They meet monthly and serve the following functions:

- providing support for participatory budgeting councillors;
- recording and circulating the issues discussed and the outcomes reached;
- coordinating the interim meetings;
- overseeing the execution of public interventions through the Commission for Public Works; and
- assisting in the consolidation of the district popular councils.

All these representatives are responsible for synthesizing and reconciling the requests and priorities decided upon, and helping to formulate a budget proposal to be submitted to the city councillors who are responsible for the final approval of the municipal budget and the expenditure plan.

Timescale of decision making (see Figures 2 and 3)

March: Groups of citizens meet with residents’ associations, non-governmental organizations, community groups and unions to discuss the main issues relating to their areas of interest. Together, the stakeholders draw up proposals for municipal public works and services to be presented at the district and sectoral assemblies within the participatory budgeting process.

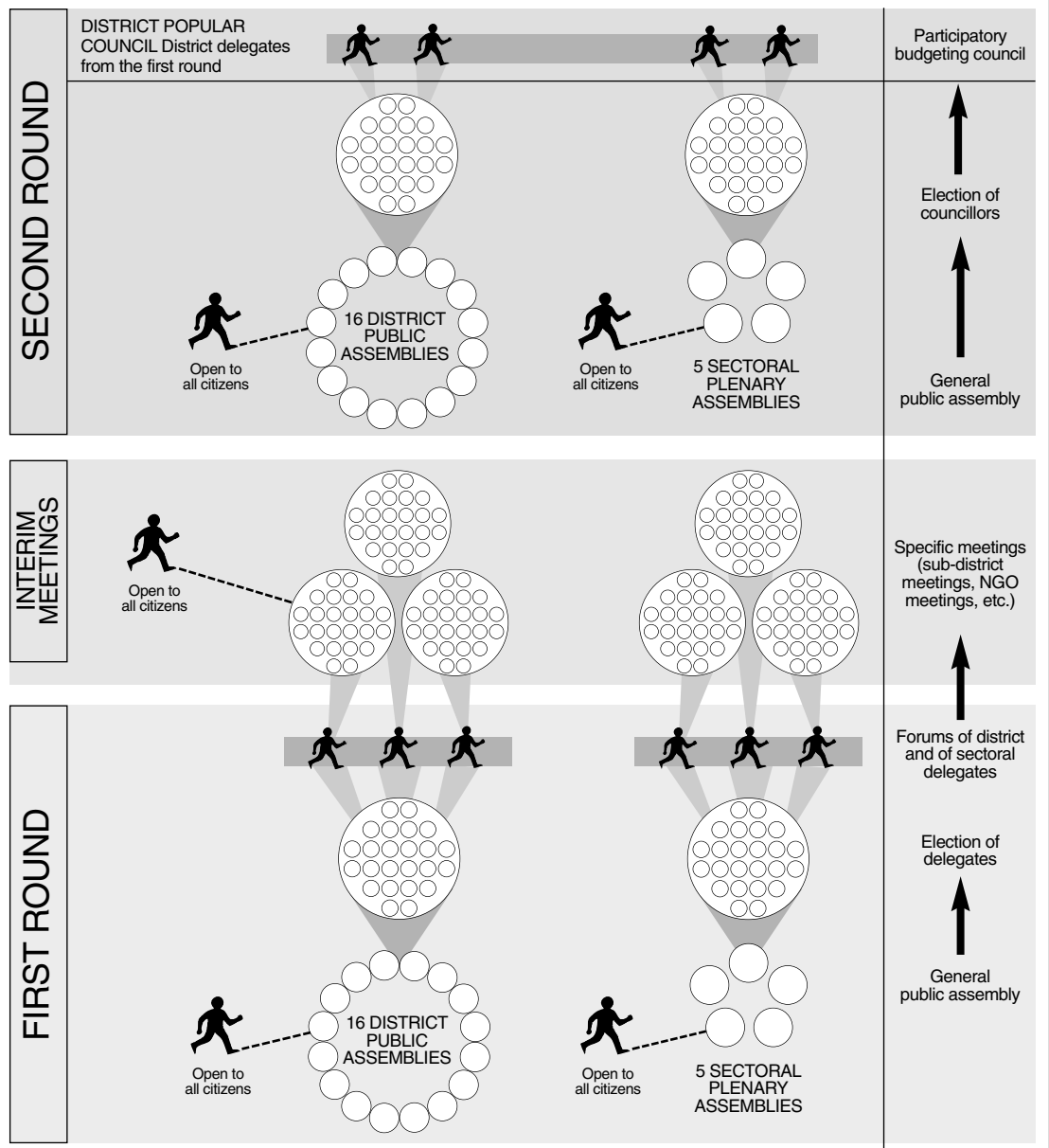
March and April: The first round of the district and sectoral assemblies takes place, in which all citizens can participate. The municipal government uses this opportunity to present the accounts for the previous year’s expenditure plan and any potential problems relating to it, and the

Table 2: Ratio of number of delegates elected to the forum of district and sectoral delegates to the number of participants at the district and sectoral assemblies		
Number of participants at each assembly	Ratio of delegates to participants	Number of delegates elected
Under 100	1 delegate per 10 participants	10
100 to 250	1 per 20	8
251 to 400	1 per 30	5
401 to 550	1 per 40	4
551 to 700	1 per 50	3
701 to 850	1 per 60	3
851 to 1,000	1 per 70	2
More than 1,000	1 per 80	less than 2

This table shows how the number of participants in regional assemblies and thematic discussions determines the number of delegates that constitute the forum of regional and thematic delegates. The ratio of number of delegates to number of participants varies according to the number of participants. For the first 100 participants, the proportion is 1 to 10. For the next 150 participants, the proportion is 1 to 20; for the next 150, it is 1 to 30. Thus, for an assembly of 760 participants, the number of delegates would be 31, i.e. 10 delegates for the first 100 participants, 8 for the next 150, 5 for the next 150, 4 for the next 150, 3 for the next 150 and 1 more for the remaining 60.

SOURCE: Porto Alegre Municipal Government, Department of Social Communication, 1999.

Figure 3: Stages and functions of the district and sectoral assemblies within the participatory budgeting process



proposal for the current year's expenditure plan. This exercise serves two purposes. First, the public can see to what extent the previous year's plan is being fulfilled; and second, the government exposes itself to public scrutiny. Public accounting of the municipal budget is crucial for the transparency of the participatory budgeting process which, in turn, is essential for fostering respect and trust among all the actors involved.

The district and sectoral assemblies are also used to elect delegates and deputies to the forums of district and sectoral delegates. The number of delegates elected is proportional to the number of citizens present for each

district and sectoral theme, according to the ratios set out in Table 2.

The fora of district and sectoral delegates hold smaller meetings and help to organize the requests and priorities expressed by the participants. The delegates are also responsible for overseeing the timing and quality of the interventions and organizing a public meeting in the event that emergency works are necessary.

March to June: A number of interim meetings are held between the first and second rounds of assemblies. These are more specific meetings organized around sub-districts or sub-themes that follow up issues raised in the district and sectoral assemblies. This allows citizens to discuss their requests in more depth and rank their priorities according to necessity and urgency. At this point, communities debate their proposals for budget spending and public works among themselves, meaning that the process is almost entirely in the hands of citizens. The municipal government, through its secretariats and other authorities, is on hand for technical advice on proposals.

June and July: The function of the second round of district and sectoral assemblies is to approve the proposals for public spending. The municipal government announces the predicted revenue for the following year and the amount that will be available for allocation through participatory budgeting. Two councillors and two deputies are elected to the participatory budgeting council. From this point on, the participatory budgeting council is responsible for presenting and taking forward the decisions reached during the assemblies.

July and August: The participatory budgeting council and the Municipal Planning Department jointly determine the distribution of resources among the proposals approved in the district and sectoral assemblies and the public works and services proposed by the municipal government secretariats and departments.

August: The municipal secretariats and departments undertake a technical and legal analysis of the proposals in order to identify any possible barriers to implementation. Assisted by the forum of sectoral delegates and the municipal secretariats and departments, the Municipal Planning Department ranks the priorities of each district in order to compile the budget proposal.

August and September: The participatory budgeting council evaluates the Municipal Planning Department's budget proposal and ensures both that it conforms to the regulations of the participatory budgeting initiative⁽¹³⁾ (see Table 2) and takes sufficient account of the citizens' proposals. The cut-off date for the submission of the budget proposal to the city councillors is 30 September and they then have one month in which to vote on it.

October and November: The participatory budgeting council and the municipal secretariats and departments jointly draw up the expenditure plan, which allocates the available budget to the proposed public works and services for the following year. All proposed public expenditure and works are detailed in this document, which is widely circulated among the public. Budget allocation for urban infrastructure and services is based on three criteria:

- extent of deficiency (more weight is given to the least developed districts);
- population size (each district's budget allocation is proportional to the number of inhabitants); and
- priorities defined by communities (such as sanitation, education and street paving).⁽¹⁴⁾

13. Prefeitura Municipal de Porto Alegre (1999), *Orçamento participativo 2000 – bom para tudo mundo; regimento interno, critérios gerais, técnicos e regionais*, Prefeitura Municipal de Porto Alegre, Porto Alegre.

14. Prefeitura Municipal de Porto Alegre (1995), *Orçamento participativo Porto Alegre; você é quem faz uma cidade de verdade*, Prefeitura Municipal de Porto Alegre, Porto Alegre.

Table 3: Criteria used to determine the distribution of resources among districts in the participatory budgeting process	
Criteria (each district)	Weighting and grade (higher scores indicate higher priority)
<i>Extent of deficiency of infrastructure/service</i>	<i>Weighting = 4</i>
More than 80%	Grade 5
61–79.99%	Grade 4
41–60.99%	Grade 3
21–40.99%	Grade 2
0.01–20.99%	Grade 1
<i>Population size</i>	<i>Weighting = 2</i>
More than 120,000	Grade 4
61,000–119,999	Grade 3
31,000–69,999	Grade 2
Up to 30,999	Grade 1
<i>Community priority</i>	<i>Weighting = 4</i>
First priority	Grade 5
Second priority	Grade 4
Third priority	Grade 3
Fourth priority	Grade 2
Fifth priority	Grade 1

SOURCE: Porto Alegre Municipal Government, 2000.

The criteria can be modified year by year.* For instance, in 2001, the grades for population size were adjusted as follows:

<i>Population size</i>	<i>Weighting = 2</i>
More than 90,001	Grade 4
45,001–0,000	Grade 3
25,001–5,000	Grade 2
Up to 25,000	Grade 1

* Prefeitura Municipal de Porto Alegre (1999), *Orçamento Participativo 2000 – bom para tudo mundo; regimento interno, critérios gerais, técnicos e regionais*, Prefeitura Municipal de Porto Alegre, Porto Alegre.

SOURCE: Prefeitura Municipal de Porto Alegre (2001), *Orçamento Participativo 2001 – a conquista do espaço democrático; regimento interno, critérios gerais, técnicos e regionais*, Prefeitura Municipal de Porto Alegre, Porto Alegre.

The available budget and the interventions for each district are defined by combining these criteria through a system of weightings and grades (Table 3). To this is added the sectoral works and those of a city-wide nature, defined by the sectoral forums and the municipal government. The expenditure plan is therefore the result of an intense dialogue between communities, residents' associations, civil society organizations and the municipal government.

The participatory budgeting council then waits for the city councillors to vote on the municipal budget by the 30 November deadline. This period always produces an intricate conflict between representative democracy and participatory democracy. Although there is natural tension between the two styles of governance, this has been quite positive in Porto Alegre, as the city councillors discuss and engage in contentious debate with both the municipal government and the participatory budgeting initiative. To date, any changes that the city councillors have eventually made have not affected the overall structure of the budget proposal because they are aware that it was the outcome of a process with a high degree of public participation.

December and January: The district and sectoral delegates evaluate the participatory budgeting process and the results obtained over the year, with the aim of learning from the lessons identified and improving the initiative's internal regulations.⁽¹⁵⁾ The participatory budgeting council then votes on the regulations for the following year. In February, the council goes into recess, to resume in March. The commissions for public works, made up of citizens elected from the districts, now oversee the implementation of the expenditure plan on a permanent basis.

15. See reference 12.

b. Results of participatory budgeting

The participatory budgeting process has been undergoing constant development and improvement since its introduction in 1989, under the administration of the Workers' Party (*Partido dos Trabalhadores*) in coalition with other parties of the Popular Front (*Frente Popular*) that continues to govern Porto Alegre. During this time, the municipal government has allocated between 15 and 25 per cent of the total budget to public spending. The rest is designated for municipal staff salaries and municipal government administration.

Over the last ten years, public works totalling more than US\$ 700 million have been implemented through participatory budgeting. The highest priority during this period has been basic urban services (Table 4). Between 1990 and 1995, the number of households served by the drinking water network in Porto Alegre was expanded from 400,000 to 465,000 and, at present, 98 per cent of households are connected. Moreover, the sewerage network expansion has been greater still. In 1989, only 46 per cent of the population had sewer connections but this has now almost doubled to 85 per cent.

Street paving has also been a high priority for citizens, especially in the less-developed districts. Around 30 kilometres of streets are paved annually and this is always accompanied by drainage and street lighting. In low-income districts, this intervention has not only improved access by public transport but the increased traffic has helped to deter organized crime. Furthermore, it has raised the inhabitants' sense of dignity and they now feel a real part of the city that had previously neglected them.

Increased spending on education doubled the total number of pupils

Sector	Budget in the first year of each mayor's term (millions of reais*)			
	1989	1993	1997	2000 (budgeted)
Urban development, basic services and environment	134.7	189.3	307	385.8
Economic development	2.7	3.1	6.6	8.6
Social services (health, education, housing, welfare)	91.2	152.6	314.8	361.6
Culture, recreation and tourism	2.6	5.5	17.9	15.1

*Brazilian real (plural: reais): US \$1.00 = R\$ 2.50 (February 2002)

SOURCE: Pont, R (2000), "Porto Alegre e a luta pela democracia, igualdade e qualidade de vida" in Pont, R (coordinator) and A Barcelos (organizer), *Porto Alegre, uma cidade que conquista*, Artes e Ofícios, Porto Alegre, pages 11–27.

	Sector/indicator	1989	1993	1997	2000
1	Dropout rate for basic education in municipal schools (%)	9.02	5.41	2.43	1.46
2	Number of municipal educational establishments	37	69	87	90
3	Investment in housing (R\$ millions)	3.436	4.439	18.696	14.959
4	Leakage in the municipal water network (%)	50	47	39	34
5	Sewerage network coverage (km)	768	n/a	n/a	1,399
6	Proportion of treated sewage (%)	2	5	15	27
7	Green areas (square metres per resident)	12.5	n/a	13.4	14.1
8	Members of the public involved in activities of the municipal culture secretariat	398,950	n/a	n/a	1,732,900 (1999)

*Only the first year of each of the popular administration's four mayoral terms are cited, except where indicated. (n/a = not available)

SOURCES: Row 1: Azevedo, J C (2000), "Escola cidadã: políticas e práticas" in Pont, R (coordinator) and A Barcelos (organizer), *Porto Alegre, uma cidade que conquista*, Artes e Ofícios, Porto Alegre, pages 111–122.

Row 2: See reference Row 1.

Row 3: da Silva, F J H (2000), "A política habitacional no terceiro mandato da administração popular" in Pont and Barcelos, see reference Row 1, pages 153–164.

Row 4: Dutra, A L (2000), "O DMAE e a qualificação do saneamento ambiental" in Pont and Barcelos, see reference Row 1, pages 199–206.

Row 5: See reference Row 3.

Row 6: See reference Row 3.

Row 7: Lüdke, M C (1998), "Evolução das áreas verdes: dos largos às praças e parques arborizados" in Menegat, R, M L Porto, C C Carraro and L A D Fernandes (coordinators), *Atlas Ambiental de Porto Alegre*, Edufmg, Porto Alegre, pages 119–130; also Lüdke, M C, F V Mohr and R Menegat (1998), "Mapa de áreas verdes" in Menegat et al., see previous reference Row 7, pages 131–132.

Row 8: Kiefer, C (2000), "Cultura: onde o povo está" in Pont and Barcelos, see reference Row 1, pages 11–27.

enrolled between 1988 and 1996. A significant improvement in the quality of teaching was achieved through radically democratizing the school system and revaluing the teaching and administrative staff as professionals. In the health sector, the municipalization of health clinics produced a significant improvement in the level of service by ensuring unrestricted access for all residents.

In addition to the impressive figures for the different sectors (Table 5) and districts, participatory budgeting also brought about a fundamental change in the political culture of Porto Alegre. This change signified an end to the traditional top-down approach, the redefinition of public priorities in line with citizens' views, a return to citizenship and the transition to an inclusive city. The level of citizen participation has increased with each year, with around 150,000 people now involved in the process, whether in district or sectoral assemblies or in the city conferences (Table 6).

Table 6: Participants in the district and sectoral assemblies of the participatory budgeting process and the city conferences				
Year	District assembly	Sectoral assembly	City conference	Total
1990	976	-	-	976
1991	3,694	-	-	3,694
1992	7,610	-	-	7,610
1993	10,735	-	2,048	12,783
1994	9,638	1,609	-	11,247
1995	11,821	2,446	3,031	17,298
1996	10,148	1,793	-	11,941
1997	11,908	4,105	-	16,013
1998	13,687	2,769	-	16,456
1999	16,813	3,911	-	20,724
2000	15,331	3,694	8,780	27,805

SOURCE: Pont, R (2000), "Porto Alegre e a luta pela democracia, igualdade e qualidade de vida" in Pont, R (coordinator) and A Barcelos (organizer), *Porto Alegre, uma cidade que conquista*, Artes e Ofícios, Porto Alegre.

c. The municipal councils

In the early and mid-1990s, several municipal administrative councils were created. The councils incorporate mechanisms for citizen participation, thus making government decision making and policy formulation more democratic and transparent. The main municipal councils include those for health, environment, science and technology, agriculture, land and housing, and public transport and urban development (Table 7). The Municipal Environment Council is a deliberative authority formed in the majority by non-governmental and civil society organizations. It plays a key role in providing guidance for public environmental policies that are jointly formulated by NGOs and the public and implemented by the Municipal Environment Secretariat.

Municipal council	Year created	Members
Children and youth	1990	21 (8*)
Health	1990	52
Communication	1995	21*
Social welfare	1995	45 (28*)
Environment	1996	21
Culture	1997	33 (28*)
Science and technology	1995	23
Land and housing	1995	27
Education	1991	15 (12*)
Citizen groups against violence and discrimination	1990	21 (8*)
Urban transport	1994	21 (6*)
School nutrition	1999	7 (6*)
Historical and cultural heritage	1976	15 (7*)
Agriculture and food	1996	17 (11*)
Women's rights	1995	100*
Urban development	1939 to 2001	21 (12*)
Urban environment and development	2002	25 (17*)

* number of members who represent civil society organizations, sectoral municipal workshops or conferences or government institutions other than those of the municipality

SOURCE: Britto, E C de S, R Menegat and N L A Silva (1998), "A gestão ambiental pública em Porto Alegre" in Menegat, R, M L Porto, C C Carraro and L A D Fernandes (coordinators), *Atlas Ambiental de Porto Alegre*, Edufgrs, Porto Alegre, pages 199–202, with updated information supplied by the author.

III. PUBLIC ENVIRONMENTAL MANAGEMENT: PRINCIPLES AND METHODS

IN PORTO ALEGRE, public environmental management is based on six underlying principles:

- the city is an integral component of the natural ecosystem: while the urban fabric covers 40 per cent of the city's area, the natural areas within it are still important;
- the hydrological basin is the unit of environmental management;
- Porto Alegre is only one part of the wider metropolitan area;
- local government must endeavour to integrate sectoral policies;
- informed citizen participation; and
- integrated environmental education and dissemination of knowledge about the city's natural and built environments.

Citizens participate in environmental policy making through either the municipal councils or the assemblies within participatory budgeting. The implementation of environmental management policies is coordinated by the Municipal Environment Secretariat, which collaborates with other municipal secretariats and departments such as sanitation, health and urban planning in some of its activities.

a. The Municipal Environment Secretariat

The Municipal Environment Secretariat was created in 1976, making it the

longest-established municipal environment department in Brazil. The Secretariat is the executive authority responsible for the protection of the natural environment and for the control of environmental quality in the municipality. Its responsibilities range from direct action in the form of monitoring and inspection (as in the cases of deforestation, discharge of untreated waste, noise pollution), to more general duties such as the protection of biologically sensitive areas and the issuance of environmental permits.

Historically, the Secretariat focused on the expansion and management of urban green areas. From the 1990s, its remit was expanded to include the promotion of environmental protection policies for sensitive areas, the control of activities with large impacts and, more recently, the licensing of such activities. A range of different programmes was initiated to assess and control polluting activities, such as air quality monitoring and industrial, noise and soil pollution control. Most of these programmes involve partnerships with society and encourage the participation of citizens, NGOs and other institutions and businesses.

b. Integration of sectoral public policies

Porto Alegre's public services (environment, water supply, sewerage, solid waste management, urban drainage and health) are managed by the city directly, unlike other state capitals in Brazil where they are run by either state utilities or private companies. The Permanent Forum of Environmental Sanitation, set up in 1992, has been the principal institutional force behind the municipal government's efforts to integrate sectoral policies. The forum is a higher authority made up of the following high-level government bodies: Municipal Environment Secretariat; Municipal Water and Sewerage Department; Municipal Cleansing Department; Department of Drainage; Municipal Health Secretariat; Municipal Planning Secretariat; Municipal Government Secretariat (*Secretaria de Governo Municipal*); Department of Community Relations; Municipal Housing Department; and the Lake Guaíba Conservation Programme. The function of the Permanent Forum of Environmental Sanitation is to define cross-sectoral policies, resolve conflicts between sectors and ensure that municipal interventions and activities adhere to the same directives. Within the forum, the Lake Guaíba Conservation Programme coordinates the municipal interventions relating to Lake Guaíba, such as water quality improvement and the regeneration of the lakeside and beaches.

IV. INTEGRATED ENVIRONMENTAL MANAGEMENT: PROGRAMMES AND RESULTS

a. Programme for the management of green areas

PORTO ALEGRE'S GREEN areas have evolved with the city, from the squares of the old settlement founded in 1772 to the large metropolitan parks of the present. The first city squares date from the second half of the eighteenth century and were originally large public spaces used as food markets and for public and religious festivals. As the city expanded during the nineteenth century, advancements in sanitation led to the urbanization of many public spaces. When Porto Alegre became state capital in the second half of the twentieth century, maintaining an

Table 8: Proportion of green areas in relation to population in Porto Alegre		
Year	Square metres of green space per inhabitant	Population
1814	8.8	6,111
1890	10.6	52,421
1980	11.7	1,125,477
1997	13.6	1,288,879
2000	14.3	1,300,000

SOURCE: Lüdke, M C (1998), *Evolução das áreas verdes: dos largos às praças e parques arborizados*, in Menegat, R, M L Porto, C C Carraro and L A D Fernandes (coordinators), *Atlas ambiental de Porto Alegre*, Edufrgs, Porto Alegre, pages 119–120.

adequate proportion of green areas in relation to the population became particularly important (Table 8). Aside from their traditional functions, the squares and parks reduce the adverse effects of increasing population concentration and can also act as ecological corridors to ensure the survival of wildlife. However, urban growth also causes the degradation of public spaces, particularly green areas, and two ongoing programmes aim to reduce this by involving citizens in their management. The first is the Green Area Adoption Scheme, in which a partner institution ‘adopts’ a square or park and commits to undertake the maintenance and gardening; and the second is the City Square Councils Programme, which brings together interested citizens, civil society organizations and businesses who, together, organize the maintenance and gardening of a particular city square and define the rules for its use. All the city square councils meet together periodically.

b. Urban tree planting

Tree-lined streets are one of the most important features of Porto Alegre’s urban environmental heritage. There are around one million trees along public streets alone, which is equivalent to a forest of nearly 20 square kilometres.¹⁶ Tree planting along streets is one of the specific measures for environmental protection set out in municipal legislation. Various decrees and laws restrict the felling of native species and the cutting of trees in general, which can only be carried out with special permission from the Municipal Environment Secretariat. Newly planted trees comprise over 200 species native to the region, from other parts of Brazil and from other countries. Trees, with their buds, blossom and fruit, help to sustain urban bird life, and around 160 species have been recorded in Porto Alegre.

c. The Oil Pollution Control in the Service Sector programme

The Oil Pollution Control in the Service Sector programme was created in 1990 by the Municipal Environment Secretariat. It is implemented in two stages: first, a recognition of the types of activity that potentially produce oily residues; and second, a definition of procedures for monitoring and enforcing the current legislation (Municipal Decree No 9,750/90). This legislation requires the installation of treatment systems

16. Sançotene, M C, A Puente, F B Oliveira, A L Roso and P R Barcelos (1998), “Cidade das árvores: arborização urbana” in Menegat, R, M L Porto, C C Carraro and L A D Fernandes (coordinators) (1998), *Atlas ambiental de Porto Alegre*, Edufrgs, Porto Alegre, pages 133–146.

with separation devices for oily residues. At present, all licensed petrol filling stations and car washes, bus companies and mechanical workshops have at their disposal an oil and water separation chamber or a special machine for washing parts. Furthermore, since May 1992, licensing of new petrol filling stations and premises with underground fuel tanks has been conditional on the installation of leak prevention and detection systems. Such systems must include:

- soil and sub-soil profiles;
- a description of the hydrological characteristics of the surrounding area;
- details of the installation of the tanks;
- specification of the leak prevention and detection equipment; and
- use of double-walled underground non-pressurized storage tanks with flexible and sheathed pipes.

At present, there are 254 petrol filling stations with around 1,330 underground fuel tanks in Porto Alegre.

d. The Industrial Water Pollution Control programme

The Industrial Water Pollution Control programme was initiated in 1990. It focuses on industries most likely to cause water pollution and operates on the principle that the treatment and disposal of effluents is the sole responsibility of the producer. The programme consists of the following stages:

- identification of the production process;
- identification of the effluent produced;
- proposal for an effluent treatment plant;
- construction of the effluent treatment plant; and
- registration with the industrial effluent self-monitoring project.

The majority of the 93 industrial establishments in Porto Alegre have complied with the programme's requirements.

e. The Atmospheric Pollution Control programme

The Atmospheric Pollution Control programme, created in 1992, consists of five components:

- options for the energy sector, looking into less polluting fuels;
- private car use, inspecting the condition of private vehicles and promoting pollution reduction programmes;
- pollution monitoring, tracking the concentration of gases;
- air pollutant modelling, determining the dynamics of pollution; and
- legislation, seeking continually to raise standards based on the programme's results.

The programme has led to a substantial reduction in the concentration of atmospheric sulphur dioxide. One of the main reasons for this is the introduction of city diesel in the early 1990s, with a maximum sulphur dioxide content of less than 0.5 per cent compared with around 1.2 per cent for regular diesel. City diesel is the same price as regular diesel and is produced at the Alberto Pasqualini refinery by the Brazilian national petroleum company, Petrobrás.

Another important component of the programme has been 'Operation Clean Air', initiated in March 1995 through a partnership between the Municipal Environment Secretariat, the Municipal Transport Secretariat and the Police Environment Squad, with support from the Rio Grande do Sul Public Prosecution Department and the State Foundation for Envi-

Material	Quantity (tonnes)	%
Paper: cardboard, newspapers, mixed paper, clean paper	10.5	26.3
Glass: bottles, jars	6.0	15.0
Iron: tins, other iron objects	6.4	16.0
Other metals: aluminium, copper	0.6	1.5
Plastics: PET, mixed plastics	12.2	30.6
Non-recyclable materials	4.2	10.6

SOURCE: Ballestrim R A C, and A L Dutra (1998), "Resíduos sólidos: o caminho do lixo urbano" in Menegat, R, M L Porto, C C Carraro and L A D Fernandes (coordinators), *Atlas ambiental de Porto Alegre*, Edufrgs, Porto Alegre, pages 185–188.

ronmental Protection. The programme aims to reduce emissions from diesel-fuelled vehicles and, through environmental education, encourages people to keep their vehicles in good repair and to make more use of public transport.

f. Integrated solid waste management

The growing problem of refuse disposal in Porto Alegre has been mitigated through the Integrated Solid Waste Management programme. The programme aims to reduce the generation of solid waste, promote recycling and re-use, and undertake some services itself. It uses a combination of four methods:

- separation of waste at source into domestic, industrial, commercial and hospital wastes;
- household separation of waste, promoted through environmental education;
- separate collection of different types of waste; and
- different treatment, re-use and disposal for each type of waste.

Porto Alegre's solid waste management system has both reduced the quantity of waste disposed of in landfills (thus increasing their life) and introduced income generation from recycling. This has been possible through the staged adoption of techniques for recycling both organic and inorganic wastes. The separation of waste at source and separate collection has produced higher-quality separated material, which has facilitated the recycling process. The different materials are processed by waste treatment plants and sent to recycling units operated by cooperatives of former informal waste collectors. The main initiatives for separate waste collection and treatment are described below.

Waste collection and recycling programmes

Collection of separated waste. Since July 1990, household waste already separated by residents has been collected in all neighbourhoods on a weekly basis. Up to 1997, 15 per cent of the total solid waste separated in this way had been recycled.

Recycling units. The waste is sorted in recycling units, which are large

sheds containing crates for the unsorted waste and benches for manual sorting. Once sorted, the waste is compressed and baled up to be sold as raw material to recycling factories. The units are managed by autonomous cooperatives with directors (sometimes residents' associations) elected every two years. The average income of each recycler is around US\$ 150 per month.

Green waste centre. The waste produced from the maintenance of green areas in the city, which includes felled trees and cuttings, is used to generate thermal energy and to make compost. The compost, which can be enriched by adding sewage sludge (during its bio-stabilization phase), is distributed to rural farmers for use as fertilizer.

Recycling of organic waste for pig farming. In 1992, a programme to recycle organic waste for pig feed was implemented. Organic waste is collected separately and from restaurants, following strict guidelines, and is then boiled, dried and ground up into feed that is used in pig rearing. Technical assistance is also given. The programme began with four pig farmers and around 300 animals, and after five years had expanded to 14 farmers and around 1,200 pigs. Each year, the pig farmers participating in the programme donate some of their produce to deserving charities.

Waste disposal programmes

Landfill sites. Since 1997, all non-recyclable solid waste has been disposed of in landfill sites. These are constructed to a high standard in order to ensure that they do not contaminate the environment. Infiltration into the soil is prevented by the double-walled construction of a clay layer and a high-density polythene geo-membrane, the lowering of the water table and the draining off and treatment of any effluent.

V. KNOWLEDGE FOR SUSTAINABLE DEVELOPMENT: THE ENVIRONMENTAL ATLAS OF PORTO ALEGRE

FOR CITIZENS TO participate in urban and environmental management in a meaningful way, they need adequate information and knowledge about the natural and built environments to be able to make informed decisions. In Porto Alegre, it was necessary to produce and disseminate this knowledge and this was achieved principally through the *Environmental Atlas of Porto Alegre*, produced between 1994 and 1998. The *Atlas* came from an agreement between the Federal University of Rio Grande do Sul, the municipal government of Porto Alegre through the Municipal Environment Secretariat, and the Brazilian National Institute for Space Research. About 200 school and university teachers, researchers, technical staff, photographers and different logistical support groups worked for four years and nine months to put the *Atlas* together.

The *Atlas* presents the natural history of the city as upheld by the great naturalists of the nineteenth century but using twentieth-century technologies, theories and world vision. The *Atlas* is organized into three sections:

- the 'Natural Environment', with eight chapters describing and explaining the city's geology, geomorphology, hydrology, soils, flora, fauna, climate and conservation units;
- the 'Built Environment', with nine chapters presenting the evolution of the city, the urban spatial model, the development of green areas, tree

planting along public thoroughfares, the urban climate, environmental impacts and urban sanitation; and

- 'Environmental Management', with three chapters outlining the key concepts and problems of environmental management in an increasingly urbanized context; public environmental management; and environmental data from Porto Alegre itself.

The *Atlas* uses plain language to present the interrelationships between the local, regional and global environments, from the geosphere, hydrosphere, biosphere and atmosphere to the 'technosphere' and 'urbansphere'. This enables the reader to see the environment of Porto Alegre from the perspective of different scales, that is within the contexts of Rio Grande do Sul, South America and the world. The *Atlas* contains 98 maps and 128 three-dimensional diagrams in colour, and also presents the fourth dimension: time. Different cross-sectional diagrams show the evolution of events in different timescales, ranging from millions of years (in the case of a geological evolution) to hours or days (as with the development of a meteorological cold front). The 611 photographs provide the reader with a further illustrative medium to identify the landscape and, at the same time, reinforce understanding of the information and concepts presented in the text, maps and diagrams.

a. Knowledge as a basis for environmental management and citizen participation

The *Atlas* provides a solid foundation of scientific knowledge to be used for producing scenarios and forecasts on which to base the city's environmental monitoring, legislation and licensing. The establishment of environmental directives for various scenarios also means that specific issues raised by citizens can be responded to more quickly, as the information will be more readily available. In the same way, policies for areas of environmental importance will be underpinned by scientific information, leading to improved management, conservation and preservation. Adopting a sound knowledge base is also an effective way of avoiding the radical ecological ideology that often dominates environmental issues. Likewise, it evades the strongly urbanistic ideology that often fails to acknowledge the importance of environmental issues and quality in urban areas.

Environmental management cannot be effective without citizen participation and the *Atlas* provides the knowledge that citizens need in order to participate in an informed way. Knowledge also gives citizens confidence in their capacity to manage the environment and allows them to go beyond the prescriptive measures that are often irrelevant to their context. Environmental education is effective when developed with the use of local information. School pupils are more motivated when the subject being studied is part of their own reality. Understanding environmental concepts based on their own contexts also enables them to learn how to engage in citizenship from an early age.

The *Atlas* has provided all groups that engage in decision making about urban development in Porto Alegre with a tool that gives them a greater understanding of the reality in which they operate. Technical staff, school children, teachers, environmental managers, governors, business leaders, NGOs and citizens can use it as a reference resource to guide the way in which they address problems in practice. It enriches the participatory budgeting process as different stakeholders become more knowledgeable and competent vis-à-vis local environmental issues. It also means that

environmental management programmes can be integrated into mainstream social and urban life, rather than remaining confined to closed technocratic, environmentalist or even academic circles.

VI. INTEGRATED ENVIRONMENTAL EDUCATION; THE LOCAL ENVIRONMENT AS THE BASIS OF TEACHING AND LEARNING

THE SUCCESS OF environmental management programmes depends on a complex set of political-institutional and scientific factors. However, it also greatly depends on each citizen's participation and understanding of the environment. One of the principal challenges for environmental education is helping citizens to grasp the same scientific knowledge and concepts as those used by public environmental management. Achieving this is beyond the capacity of an individual sector and requires instead a combined effort from all sectors of society: government, scientific and technical, civil society, business and education.

Non-formal environmental education programmes in Porto Alegre have concentrated on knowledge about the natural and built environments. Various techniques have been used to raise citizens' awareness of environmental problems and policies, such as visits to waste-recycling units or environmental protection areas. Furthermore, the 'Environment Week', which takes place in the first week of June each year, has become an opportunity for dissemination and debate about local and global environmental problems and interaction between all groups involved in environmental policy.

Following the publication of the *Environmental Atlas of Porto Alegre* in 1998, an environmental education programme⁽¹⁷⁾ was set up based on the four components advocated in this paper (see Figure 1):

- **knowledge:** the need for scientific knowledge of the social and environmental aspects of the urban system and its interrelations at the local, city-wide, regional and global levels;
- **public environmental management:** technically competent institutions to develop strategic programmes based on local environmental knowledge, education and participation, and to collaborate with other government departments (economic development, housing, urban planning, sanitation, health, etc.);
- **education:** increasing citizens' awareness of the complexity of the urban environmental system to help them understand the reality of their environment, to develop their critical thinking and to grasp the notion of environmental management from an early age; and
- **citizen participation:** to encourage communities to engage in the management of the urban environment. This is one of the most important points raised by both Agenda 21 that came out of the UN Earth Summit in 1992 and the Habitat Agenda that came out of the UN City Summit in 1996.

Figure 1 presents these four components as the nodes of a network that are linked through constant interrelations in both directions. The functions of each component therefore need to be reorganized in line with the other components in order to form the basis of integrated environmental education.

Due to the simple language it uses to represent the natural and built environments, the *Atlas* simultaneously serves as a comprehensive scien-

17. See reference 2.

tific reference, a tool for environmental planning and an educational resource for actors of different cognitive levels, from primary school children to technical professionals. In this way, the *Atlas* has fostered the transfer of academic knowledge to the municipal education system and the public domain, and is thus being used for the same urban environmental management purpose by different actors:

- **researchers:** the *Atlas* enables them to realign their research and knowledge with the needs of wider society;
- **decision makers and urban and environmental management professionals** can now access the hitherto impenetrable realm of technocratic information;
- **teachers** in the municipal education system can use the *Atlas* in the classroom to help children discover their local environment from the starting point of environmental problems; and, most importantly,
- **citizens:** through increased knowledge and critical thinking, they will be better able to reduce or mitigate threats to their environment.

a. Education: a fundamental component for environmental management

The above shows that the education component is an essential part of environmental management and the best place to carry it out is in schools. To achieve this, schools need to be considered as centres of local knowledge for the wider community, that is, they need to contribute to the production of knowledge. Schools should therefore be integrated with the processes of the other three components, leading to a form of teaching that is both socially relevant and that encourages pupils to discover and construct their local environment. Instead of merely imparting standardized knowledge, schools can become reference centres for local information and, eventually, a resource for other educational establishments.

VII. FINAL REMARKS: DEMOCRACY AND SUSTAINABILITY

THE GREAT CHALLENGE that faces both present and future generations is urban environmental management for sustainable development. The various aspirations of society – social harmony, fairer income distribution, technological and industrial development, quality of life – all hinge on our capacity to manage the environment. These aspirations are more likely to be fulfilled if citizens acknowledge that they can influence their local environment through knowledge and participation. Environmental management and education programmes are thus key components of a system of integrated environmental management. In line with this, sustainable development can be seen as a social process of recognizing the totality of the urban environmental system and the possibility of ensuring quality of life for all.

No environmental management plan will be effective without the participation of citizens, and the more information about the environment that is available to them, the more meaningful public participation will be. A commitment to sustainable development entails adopting participatory mechanisms that reach and involve a wide range of social groups. Devising strategies for a common future does not mean just setting out recommendations for better approaches on paper but also achieving real changes

in practice. For instance, it implies a commitment to ethics that requires the assent *and* the engagement of each citizen. Adopting a sustainable development strategy requires changes in cultural, economic, political and social practices, but citizens will only reform their cultural and social behaviour if they understand the importance of adopting new attitudes.

However, these new mechanisms for participation should not be restricted to mere consultation, in the way that Agenda 21 has been interpreted in some cases. They should have the real power to influence urban management (whether carried out by government or private sector agencies), so that the formulation of public policies becomes central to the sustainable development strategy. This means that sustainable development cannot be implemented without incorporating mechanisms that increase the decentralization of power, democracy and social inclusiveness.

This vision of achieving equal importance for processes that work towards sustainable development conflicts with the policies of the minimal state. Local Agenda 21 is regarded as a consultation exercise with a selection of important actors, possibly influencing the prominent market thinkers through its recommendations. In any case, the market should decide whether it wants sustainability, as it has ignored this thorny issue for a long time. However, in the South, sectors that are important for sustainable development are not even integrated into the market. The prospects for sustainable development are better if Local Agenda 21s can become channels through which social inclusiveness is increased. This can be implemented by way of forums and decision-making bodies that are capable of exerting social influence on the key traditional state institutions, namely the executive government, parliament and the judicial system. Otherwise, Local Agenda 21s will only result in prescriptions for action, without benefits for or interaction with society.

Processes that continually enhance democracy are also the best routes through which to address the important cultural, racial and gender differences within Brazilian society. Sustainability is, after all, always 'ethno-sustainability', as it necessarily respects individuals' ethnic and cultural traditions. Failing to consider these traditions means disregarding the heterogeneity of contemporary societies, whether as a result of their historical development (as in the case of Latin America, where European colonizers destroyed existing great civilizations) or through the many international migratory flows that are so characteristic of the modern world.

Furthermore, minimal state policies also conflict with the issue of city financing. Whilst such policies foster rapid urban growth with its associated problems, the Brazilian government is increasingly shedding its former responsibilities and declaring itself a minimal state. Local governments are facing significant difficulties in responding to these additional demands, as they lack effective administrative capacity and have increasingly scarce resources at their disposal. The resulting increase in social tension works against democracy and sustainability as it increases urban social segregation. In spite of this, Brazilian municipalities have become the leaders in developing successful Agenda 21s and have produced the most significant experiences within the local government arena.

In the case of Porto Alegre, progress to date shows quite favourable standards of environmental quality. Through information and citizen participation, communities will be able to rise to the new challenges of global environmental management. In this way, the more Porto Alegre builds its capacity for environmental management in terms of local sustainability, the greater the contribution to global sustainable development.