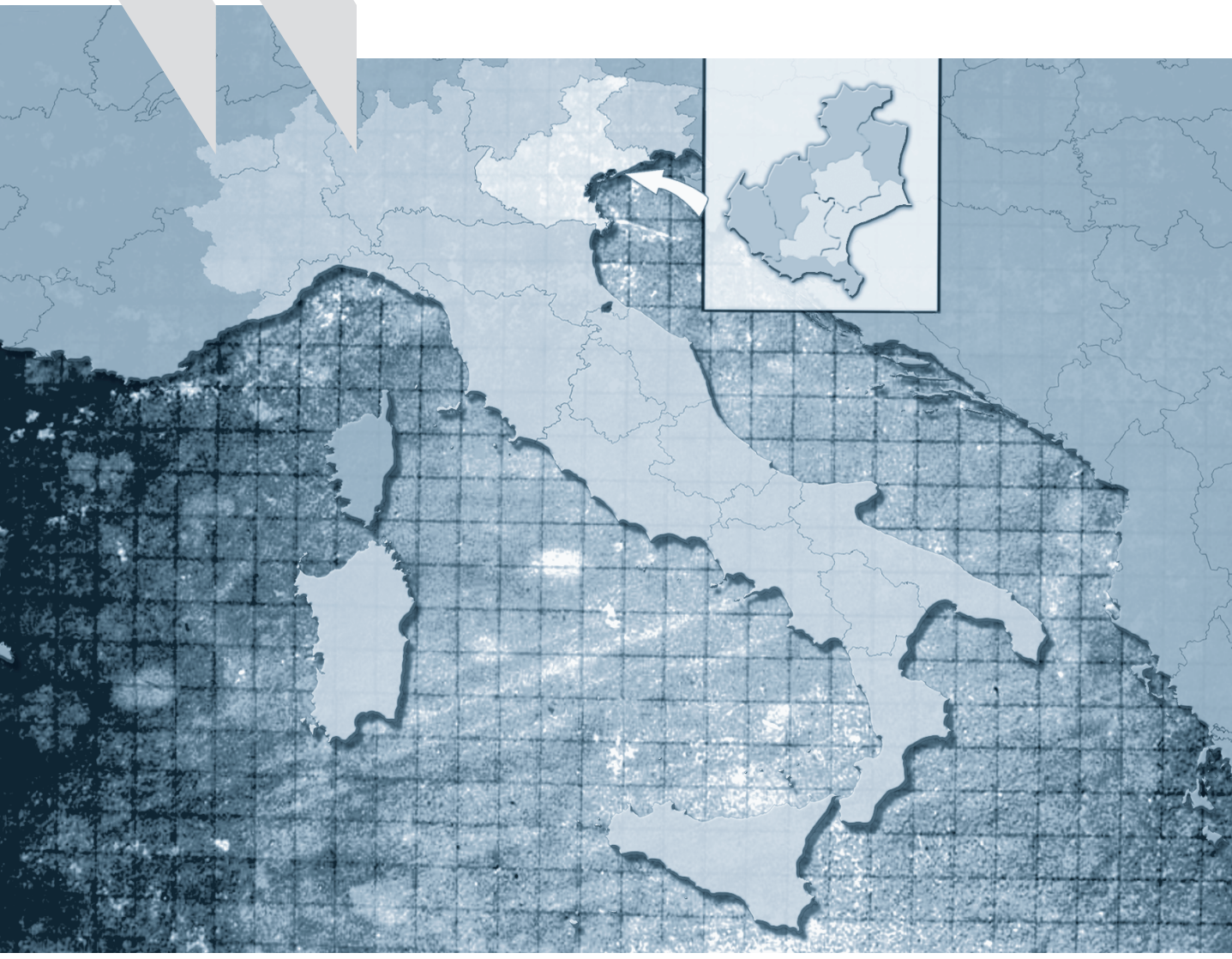
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VENICE, ITALY



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Foreword

Across the Organisation for Economic Co-operation and Development (OECD), globalisation is increasingly testing the capacity of regional economies to adapt and exploit their competitive edge, while also offering new opportunities for regional development. This is leading public authorities to rethink their strategies. Moreover, as a result of decentralisation, central governments no longer have the sole responsibility for development policies. Effective relations between different levels of government are now required in order to improve the delivery of public services.

The need to pursue regional competitiveness and governance is particularly acute in metropolitan regions. Although they produce the bulk of national wealth, metropolitan economies are often held back not only by unemployment and distressed areas but because opportunities for growth are not fully exploited. Effective metropolitan governance is called for if a functional region as a whole is to reach its full potential.

In 1999, the OECD, responding to a need to study and spread innovative territorial development strategies and governance in a more systematic way, created the Territorial Development Policy Committee (TDPC) and its Working Party on Urban Areas (WPUA), as a unique forum for international exchange and debate. Among the activities the committee has developed are a series of case studies on metropolitan regions that follow a standard methodology and common conceptual framework. This allows countries to share their experiences, and is intended to produce a synthesis that will formulate and diffuse horizontal policy recommendations.

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- **Germany:** Malte Bornkamm, Deputy Head of Division, European Regional Policy, Federal Ministry of Economics and Technology (BMWi);
- **Mexico:** Sara Topelson de Grinberg, Under-Secretary for Urban and Regional Development (Secretaría de Desarrollo Social);
- **Portugal:** Pedro Liberato, Advisor for Environment, Territorial Development, Agriculture and Fisheries, Portuguese Permanent Delegation to the OECD; and
- **United States:** Lance Pressl, President, Chicagoland Chamber of Commerce.

The Review similarly benefited from the insight of international experts: Professor Karen Bakker (Director of the Water Governance Institute, University of British Columbia), Professor Colin Crouch (Warwick University), Paolo Gurisatti (President of STEP, Vicenza), Danielle Mazzonis (independent cultural expert, Rome), Jane Da Mosto (independent expert, Venice), and Professor Raffaella Y. Nanetti (University of Illinois and the London School of Economics). The quality of the second mission was enhanced by the participation of David Everatt, Executive Director of the Gauteng City-Region Observatory in South Africa.

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This Review was co-ordinated and drafted by Michael G. Donovan, urban specialist at the OECD, under the direction of Lamia Kamal-Chaoui, Head of the Urban Development Unit. Individual contributions were provided by Javier Sanchez Reaza (economic development), Olaf Merk (local finance and governance), and Daniel Sanchez Serra (metropolitan database).

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Assessment and recommendations

On the surface, Venice seems to be a productive and dynamic city-region

One of the largest economies in Italy is situated in the Venice city-region, defined as the totality of the provinces of Venice, Padua and Treviso along with the Venice Lagoon and its archipelago of 117 islands. The Venice city-region ranks as among the most dynamic and productive cities in Europe. Although Venetians are richer than the average Italian, they have a per capita GDP (USD 32 941) comparable to that of Toronto or Barcelona, which rank behind the OECD average. However, the Venice city-region is catching up fast. Compared to OECD metro-regions, its economic growth rate can be compared to that of London, Stockholm or Houston, placing it among the top ten performers in Europe. Its average annual economic growth rate, at around 3%, is 50% higher than that of the average OECD metro-region, and from 1995 to 2005, it grew at three times the rate of Randstad in Holland and such high-tech cities as Seattle. This economic growth has been fuelled by productivity gains. Although the Venice city-region's labour productivity levels are still only 4% lower than the average for OECD metro-regions, they are nevertheless comparable to rates found in Frankfurt, London, Munich, Sydney and Tokyo. Average annual productivity growth (1995-2005) grew at double the speed of Stockholm and almost triple the rate of New York. This has allowed Venice to slash the gap between its productivity levels and those of the average metro-region to one-third of what they were in 1995.

Economic complementarities among Venice, Padua and Treviso, and a rich entrepreneurial milieu, are the city-region's strongest assets…

The Venice city-region (with a population of 2.6 million) encompasses three important provinces (Padua, Treviso and Venice) that complement each other economically and have thrived under a model of entrepreneurism. In the Veneto Region, where the Venice city-region is located and which accounts for approximately 55% of the population and roughly the same percentage of value added, one firm exists for every ten inhabitants. Small and medium-sized enterprises (SMEs) have been able to adapt quickly to shifts in consumer trends across a broad range of industries. Although only around 2% of the city-region's population lives in the historical centre of Venice, it remains one of the world's main tourist destinations. Padua has specialised in knowledge-intensive activities and Treviso in manufacturing. Together, this area has become legendary in the field of economic development: its industrial districts and the involvement of small and medium-size enterprises (SMEs) are often referred to as the "Veneto miracle" or the "Third Italy" model.

This success was fuelled by an export-oriented strategy. While in 1970, less than 10% of the Veneto's GDP derived from exports, by 2000, that figure had more than tripled. The Venice city-region alone accounts for around one-quarter of all Italian exports and for over 40% of Italian "luxury" goods sold abroad. Manufacturers have taken advantage of the growing global appeal of the "Made in Italy" label. The district of Montebelluna, for example, produces three-quarters of all ski boots and half of all technical hiking and climbing apparel in the world. A network of highly specialised subcontractors provides the stitching and finishing for garment companies such as Benetton, whose headquarters are in Treviso.

…but it remains vulnerable to shocks from a changing global economy

However, it is precisely its economic success that renders the city vulnerable to external shocks. Productivity has fuelled economic growth, but not all sectors have grown at the same pace. Non-tradables have become distinctly more productive than tradables and have shifted employment towards knowledge-intensive business services. Such productivity differentials yield higher wages in the services sector and raise costs in agriculture and manufacturing. To compete, the Venetian economy has temporarily adapted by off-shoring or out-sourcing parts of the production processes to regions where labour costs are cheaper. Simultaneously, it has either concentrated on highly differentiated and design-driven products or simply relied on informal workers attracted from other countries by the city-region's higher wages.

To date, Venice has enjoyed a marked success, but questions remain as to the limits and adaptability of its model. The Venice city-region is undergoing a period of rapid economic evolution in response to a series of economic shocks. These include the introduction of the euro in 1999, which prevented Italy from taking advantage of competitive currency depreciation to increase its market share. A new competitive model emerged based on innovation and knowledge-intensive activities. Competition from Asia administered a second shock, particularly in the textile, clothing and footwear industries, catching many companies off guard. Imports from China to the Venice city-region increased sevenfold between 1995 and 2007.

The region has experienced a profound change in its industrial mix that the local labour force may not be able to fully support…

Like many OECD metro-regions, Venice is undergoing a profound industrial shift towards services and knowledge-intensive activities, which has increased demand for qualified and knowledge workers. From 1970 to 2004, value added in Veneto's service sector almost tripled. At the same time, the contribution of new knowledge-intensive activities to national employment (such as information and computer technologies and research and development) grew rapidly. The manufacturing firms that managed to thrive in this changing environment focused on differentiation and a more intensive use of knowledge rather than low value-added production. However, survival under this emerging manufacturing model relies heavily on a pool of qualified labour, and Venice has not been able to produce enough qualified workers to support such a change. Despite positive increases in educational attainment, only one in ten Venetians have a tertiary

education degree. Amongst OECD metro-regions, only Istanbul and Izmir in Turkey score lower. In addition, the polytechnical training prevalent among SMEs does not generally result in business skills at the requisite level for entering global markets. Human capital could therefore pose a critical obstacle to the city-region's transformation.

Relatively low spending by the Veneto Region on research and development (R&D) and the modest numbers of patents generated leave the Venice city-region at a disadvantage. With less than 80 patents per million inhabitants in 2005, it ranks 20% below Milan; the average OECD metro-region produces more than twice the patents Venice does, and its close neighbours Munich and Zurich, produce at least three times more patents. This is due, in part, to low R&D expenditure in the Veneto. In 2006, only 0.72% of Veneto's GDP was dedicated to R&D, as compared to the EU15 average of 1.83% and the Italian average of 1.12%. While the overall levels are still comparatively low, Veneto should be applauded for its recent initiatives to fund R&D. Its R&D investment doubled from 2003 to 2007 from EUR 365.4 million to EUR 731.0 million. On the national level, Italy ranks eighth-lowest in OECD rankings for both public and private per capita R&D expenditure and number of researchers per 1 000 of population. However, as in other regions, many of the innovative techniques used by manufacturing firms in Venice, *e.g.* in footwear and furniture production, are often not patented.

…and demographics and labour market trends could prove problematic

Venice's economic model is not only challenged by external shocks and low human capital development, but also by demographic trends linked to poor labour market performance. Population growth in the region is critically low, and its labour markets do not encourage female participation and have heavily relied on informal workers. Low fertility rates in the Venice city-region (1.4 children per couple) are insufficient to sustain a population (at 2.1 children per couple or "replacement level fertility"). It is projected that Italy's labour force will shrink at an annual rate of 0.4% from 2000 to 2020 and at double this rate from 2020 to 2050. In addition, the city-region also has a rapidly ageing population. In 2005, it had the seventh-highest elderly dependency rate among OECD metro-regions, roughly equal to that of Milan, but below those of Turin and Osaka. Effects are particularly acute in Venice's historic centre, where the average age is 49 years old. Venice's predicament is typical of Italy, which has the highest elderly dependency ratio in the OECD, second only to Sweden. Likewise, in 2004, only about one-quarter of Veneto's workers between 55 and 64 were economically active, significantly less than the EU15 average of 42%. In addition, the elderly retire earlier, putting further strain on the pension system and reducing participation rates. Overall, the Venice city-region scores in the bottom quarter of OECD metro-regions in labour market participation.

Immigration may buffer Venice from the effects of ageing, although it has created new challenges, such as undocumented workers. The Venice city-region has become the second most diverse region in Italy, after Milan. Immigrants, mainly from Romania, Morocco and Albania, have helped to sustain the population and labour force. Their arrival has been described as a "youth movement": while one-quarter of the population of the Venice municipality is 65 or older, less than 2% of foreign inhabitants fall into this range. In 2009, the documented foreign-born population in the city-region was around 8%, much lower than in Munich (23%) or Vienna (17%), although it was

projected to rise to around 18% by 2027. As the Venice city-region continues to turn towards a service-oriented economy, knowledge workers will be critical, and highly skilled immigrants will be in demand. However, it has not attracted enough highly educated immigrants or instituted large-scale programmes to train its growing immigrant labour pool. Meanwhile, the hiring of informal workers has created new challenges, including a loss in tax revenue and of the social protection provided under labour legislation.

These new economic challenges are amplified by a sprawling spatial structure …

Low-density, sprawling development was a by-product of the Veneto's decentralised form of production, which favoured SMEs and mini-factories in rural areas. Minimal enforcement of land use controls and inexpensive land encouraged residents to convert rural into industrial or commercial areas, and family-based businesses developed on the side. Many of these small businesses grew into mini-workshops or *capannoni*, resulting in what many Italian urbanists refer to as "*città diffusa*", a sprawling "urbanised countryside" model. This enshrined an inefficient and non-economical rationale for infrastructure extension, elevating the capital costs of building more schools and extending roads, water and sewer lines, and storm water drainage systems. In the absence of a metropolitan transport network, traffic has increased: passenger traffic nearly doubled from 1990 to 2003. As many of the technologies in the *capannoni* become obsolete, and the regional economy shifts towards services, opportunities will arise for a more rational spatial model. For this reason, the Veneto has been described as a region suspended between a dying rural world and a nascent metropolis comparable to Los Angeles.

Historic Venice has a globally recognised image with celebrity status…

The water bound historic centre of Venice and its canals endows the region with a distinct identity and instant international name recognition. The 39.5 million tourist visits to the city-region in 2008 testify to its appeal, making it one of the most visited destinations on the planet. Venice's architecture, its 150 canals and its 400 bridges, offer a built environment that is the envy of other cities, and Venice's image has been appropriated and replicated by cities from Las Vegas to Macau. Demand for housing in historic Venice is consequently very high, and it has become the most expensive urban real estate market in Italy.

…yet does not function as an economic centre for the city-region

Despite its appeal for tourists, the 7.6 square kilometres of Venice's historic centre cannot be considered a "downtown" in the sense of an area that pools talented professionals and concentrates advanced services. Such downtowns tend to facilitate the production and use of technical and organisational knowledge, and without a true economic centre, the city-region may be failing to create an environment that can transfer ideas across diverse sectors. The population of historic Venice has fallen from 180 000 in 1950 to 60 000 in 2000. Lower intra-urban transport costs could favour greater

knowledge diffusion and face-to-face interaction among workers. Venice does not exist in a vacuum; it is part of an urban belt that includes Milan, 240 kilometres to the east. The service sector is generally reliant on Milan, and the Venice city-region might do well to complement its activities rather than compete with them.

The city-region faces infrastructure dilemmas typical of polycentric areas …

A principal challenge is how to adapt the existing infrastructure network to cultivate synergies and agglomeration economies, given that the nodes are relatively unconnected. The low-density growth model gradually introduced in the Venice city-region has resulted in traffic congestion, higher infrastructure expenditure and a less dynamic urban core. Improving the infrastructure network is therefore vital for better integration. Though the Venice city-region is endowed with a greater availability of infrastructure than the regional average in Italy, it has shown significant weaknesses, which include:

- **A rail system that does not fully support intra-metropolitan connectivity.** The Veneto's road systems principally provide connections to their main cities, as opposed to an integrated metropolitan network. The metropolitan region lacks a unified fare system and adequate junctions between road and rail transit.
- **A railway system disconnected from the north-west Italian and European urban systems.** The Venice metropolitan region has no high-speed rail connection to Milan, and in addition, only a small proportion of the goods produced in north-eastern Italy pass through Venice's port. Of the 1.3 million containers originating from the north-east, only 25% pass through the Port of Venice each year.
- **Increasing road traffic and congestion.** Though several infrastructure improvements have broken ground, the road network is operating far beyond its capacity. Traffic across the Veneto increased by 150% from 1985 to 2000.
- **Insufficient connections between airports and railways.** Passenger traffic has increased at the two airports, one in Venice and the other in Treviso, but they remain disconnected from the railways, which has constrained growth in their handling of freight. In 2007, the airports processed 11% less freight than they did in 2006.
- **Lack of connections from the Port of Venice to the hinterland.** Although Venice's port scores reasonably well on several port performance indicators, the decline of the railways has resulted in traffic congestion, which has complicated road access from the hinterland and limited the region's competitiveness.

…but Venice's infrastructure is unusually vulnerable to climate change and flooding

Average water levels in historic Venice are now almost 30 centimetres above those in the late nineteenth century, and the frequency of high water events has increased tenfold. Flooding causes property damage – as in the 1966 flood – and accelerates the rate of decay of buildings. To safeguard historic Venice and other settlements on the Venice Lagoon, the Italian government is undertaking Italy's largest infrastructure project, the

EUR 4.68 billion MOSE flood barrier system (standing for *Modulo Sperimentale Elettromeccanico*, or experimental electromechanic module; Mose is also the Italian name for the Biblical figure Moses). Currently 63% completed, the flood barriers will be operational in 2014.

The local government will continue to bear significant maintenance costs in responding to humidity-related damage as Lagoon water infiltrates Venice's buildings and degrades its infrastructure. The local government is currently involved in raising pavements and buffering banks in response to chronic flooding. The 12 global climate models used in the Inter-governmental Panel on Climate Change's Fourth Assessment Review indicated that by 2100, not only will sea levels at the inlets increase in Venice by an unknown amount, but that it should expect a 3° to 5°C increase in air temperature, a 10% reduction in rainfall, and an increase in solar insolation of the Lagoon.

Declining environmental quality may compromise the city-region's attractiveness

In addition to future impacts of climate change, a number of other environmental challenges have increased costs for businesses and their workers and have compromised the city-region's attractiveness. These include poor water quality, strain on water resources and declining air quality.

- **Poor water quality.** Venice's water has been polluted by untreated sewage, atmospheric deposition and the ongoing release of contaminants sequestered in sediments originating from industrial activities. The Lagoon is still mired by a legacy of discharge of mercury, dioxins, and hydrocarburants from the petrochemical processing in Port Marghera, once the largest industrial complex in Europe. Also problematic are agricultural run-off and sewage from the historic centre, which is largely untreated and flows directly into the Lagoon.
- **Strain on water resources and high network leakage.** The polycentric mode of development boosts water consumption. The Venice municipality has one of the highest rate of water usage among its European peers of between 250 000 and 499 999 inhabitants. Network leakage is still excessive: in 2006, the municipality lost more than 37% of its water through leaks.
- **Declining air quality.** Air quality has declined in the Venice metropolitan region as a result of industrial pollution and increased automobile use. While nitrogen dioxide emissions are not a major concern – concentrations are, on average, below the legal limits for the protection of human health – the presence of fine dust particle concentrations (PM_{10}) exceeds legal limits on multiple days each year. One key cause of air pollution is the high volume of automobile traffic, due in large part to the Venice city-region's sprawling spatial structure and relatively under-developed rail network. Indeed, in 2008, road traffic accounted for 29% of all PM_{10}, 64% of all carbon monoxide (CO), and 42% of nitrogen oxide (NO_x) emissions in the Veneto.

Four main policy issues remain to be resolved…

In light of these critical transformations, the Venice city-region faces four main challenges to its competitiveness.

1. **Developing innovation and labour market inclusion.** First, the Venice city-region may be in need of an economic upgrade, given its traditional dependence on tradable goods and in the face of recent foreign competition. The city-region could capitalise on market trends in a way that improves participation in its labour market. Especially for excluded groups (older workers, women and immigrants), much could be done to improve worker skills, expand innovation capacity and reinforce the entrepreneurism of SMEs.
2. **Improving mobility and interconnectivity between Padua, Venice and Treviso.** Second, given the benefits of agglomeration and densification for service-based economies, metropolitan integration may need to be made a priority. Several measures could help promote a more synergistic metropolitan economy, including building a metropolitan transportation network, curtailing urban sprawl, and fostering inter-firm linkages across the city-region.
3. **The recognition and integration into policy of environmental concerns.** Third, given its environmental vulnerability and the fact that 75% of the province of Venice is below mean sea level, the application of a "climate lens" could better protect the region's population and economy. Given its vulnerability to climate change, erosion, rising sea levels, rising temperatures and water pollution, an environmentally blind development model cannot be sustainable in the long-term.
4. **Incorporating a metropolitan vision of governance.** By and large, a spatial conceptualisation of the interconnected metropolitan area has not informed strategic policy decisions in the Venice city-region, which for example, has no metropolitan transport agency. A metropolitan spatial vision could improve the policy process, in setting agendas, policy formulation and approval, implementation and monitoring.

Developing innovation capacity and enhancing labour market inclusion

A regional innovation system could operate as a catalyst for Venice's economic transformation

Capitalising on its entrepreneurism and the export-driven approach of many of its firms, the Venice city-region could move towards a higher value-added regional innovation system. This would bolster competitiveness, which could improve the relative weakness of science-based technological innovation in the tradable manufacturing sector. Despite promising initiatives, the Venice city-region has struggled to compete with science-based regional innovation systems, like those in Sweden and Finland. Improving the regional innovation system could enhance the city-region's attraction of foreign direct investment, which accounts for only 0.5% of the total in Italy.

Innovation capacity could be improved and links developed between universities and business…

Like the Veneto, Italy as a whole has under-performed in creating structured relationships between innovative firms, local universities and other research centres. Italian universities suffer from organisational problems, and do not have a strong record of systematically providing meritocratic career routes for talented young researchers and building strong relationships with international scientific networks. Though Law N. 230/2005 allows for universities to establish partnerships with private corporations, projects are only just beginning to be designed and implemented that create incentives for university professors to work with the private sector and vice versa. New initiatives are of particular importance given the research clusters affiliated with the University of Padua and its 63 000 students.

…through the support of "bridging institutions"

Innovation could be better supported through the promotion of industrial liaison programmes and "triple helix" organisations. These "bridging" institutions help commercialise activities through hybrid public-private research laboratories or specific projects to subsidise experimental collaboration, such as public programmes that encourage the movement of personnel between university and private laboratories, generate spin-offs and attract capital for research activities. Though the Venice university community announced that it would favour the development of such networks rather than the creation of a new technical university (the Politecnico), a robust network has not emerged. The Venice city-region could well benefit from the example of other OECD regions, such as Helsinki's "triple helix" model, which has instituted a new regional innovation system to facilitate the flow of knowledge through the entire production framework. The Chicagoland Chamber of Commerce model, since it involves public-private coalitions to promote innovation, could also be profitably studied. Its programme was also operationalised at a metropolitan level, which is appropriate for the Venice city-region, given the merging of the Venice and Treviso Chambers of Commerce in 2009.

Provide business development services to facilitate SMEs' entry into global markets

A regional innovation system is not a panacea; SMEs require business development services in order to expand and enter global markets. Though co-operation between small firms and district-level vocational training institutes is flourishing, such institutes tend to concentrate on reproducing existing techniques and craftsmanship, discouraging exploration of radical innovations. Connecting the Venice city-region's vocational/polytechnic schools to worldwide networks and technical associations could provide a model for innovation and growth for SMEs. Bolstering the "scaffolding structures" (trade fairs, professional organisations, certification bodies and communication media) among SMEs could provide the tools needed. Though the Veneto Region has adopted a bottom-up policy (Law 8/2003) for recognising emerging "local development systems", revisions to this law could help level the playing field and ensure that it can benefit smaller, less-organised groups that may not have the tools necessary to compete with bids from larger trade associations. Given appropriate support, SME

manufacturing in niche markets could be compatible with growth, despite low patent rates and a labour force with low levels of tertiary education.

Improve the business environment through tax reform and a reduction of court backlogs

Although tax payment and dispute resolution have been simplified in recent years, government agencies could help reduce the paperwork that business must contend with. As reported in the *Doing Business in Veneto 2009* report, "In Padua, a typical medium-sized company makes 15 payments, pays 73.6% of its commercial profit, and spends 351 hours per year on tax compliance. … Within the EU, only Poland and Romania make paying taxes more burdensome." Companies in Italy are required to maintain six separate accounting books for tax compliance purposes, which is particularly onerous for SMEs without full-time administrative staff. Delays in Veneto's court system are another bottle-neck, and resolution of commercial disputes can take up to three times longer than in the rest of the EU. In Padua, for instance, the conduct of a typical court case involves 41 procedural steps, lasts approximately 1 808 days, and costs 27.3% of the value of the claim. It takes on average 30 days to file the case, another 1 406 days to conclude the trial, and an additional 372 days to enforce the judgement. According to the *Doing Business in Veneto 2009* report, Padua ranks 156th out of 181 regions in resolving commercial disputes. The exceptional duration of litigation in Italy has even attracted the attention of the European Court of Human Rights.

An explicit green innovation strategy could be introduced

The city-region's expertise in flood protection and associated renewable energy projects could be commercialised, supporting the creation of green jobs in infrastructure, clean-tech R&D, green building, hydrogen and fuel cell production, and wind and solar energy. Progress has been made at Port Marghera's Fusina power station, which opened in 2009, becoming the world's first industrial-scale, 16 megawatt, hydrogen-fuelled power station. It generates enough electricity to meet the needs of 20 000 households each year and avoids the emissions equivalent of 17 000 tons of carbon dioxide that are typically emitted when using coal-fired plants. Promising initiatives have been launched in the historic centre of Venice, where the Arsenale, its traditional shipyard, has been converted into a seedbed of research in maritime engineering. Future projects could take advantage of EU funding available to stimulate the renewable energy sector. Part of the funding from the EU Operational Programmes could be applied to leverage co-funding from the Veneto to foster these new green activities and incorporate them into long-term strategies rather than short-term projects.

Continue to support programmes to help immigrant assimilation

Immigrant entrepreneurs could become a vital economic force if more resources were dedicated to confronting the problems immigrants face in establishing businesses, including poor access to information, inadequate access to credit, limited business language skills, difficulty in obtaining recognition of professional skills, and obstacles to involvement in professional associations. Immigrants would benefit not only from

incentives (finance, training and employment), but also from greater diversity in the business culture, which could be provided by international and migrant workers or groups. As its service economy develops and highly skilled immigrants arrive in the Venice city-region, the accreditation of foreign qualifications and recognition of foreign experience will be of cardinal import. Immigrant integration could be accelerated by professional associations with the authority to set standards of practice, assess applicants' qualifications and credentials and register or license qualified applicants. The example of Professional Engineers Ontario, which provides "bridge-to-work" programmes to help immigrants acquire the work experience necessary for professional certification, provides a useful reference for cultivating further input by professional associations. Business associations and networks in the Venice city-region could play a key role in spearheading such involvement, given their extensive contacts with local professional bodies.

Support the entry of women into the formal labour market

Female participation rates could be increased in anticipation of the long-term challenges of an ageing population. The female participation rates in the Venice city-region are among the lowest in OECD metro-regions, exceeded only by those in Busan, Seoul and Naples. On the whole, trends are positive and the female employment rate is steadily increasing. As the labour force is increasingly called upon to sustain an elderly population and the pension system, further participation of women could make a difference, with the help of appropriate child care, parental leave and policies against gender discrimination. In 2007, male engineering graduates in Veneto's universities, for example, outnumbered female graduates by six to one. Social care and professionally provided care, given Veneto's ageing population, could also provide a wide range of employment opportunities.

Strengthen the employability of older workers through continuous training and job placement services

Well-designed vocational training designed for older workers could increase their employability and participation in labour markets. Employers may be reluctant to give training to older workers because they do not expect them to remain long enough with a firm to gain a sufficient return on their investment. Older workers, in turn, may be reluctant to engage in training because programmes may not be suited to their needs or because the opportunity costs of further training may be too high given the expected financial returns. Older workers in the Venice city-region are particularly vulnerable, given their high activity rates in SMEs, which tend to offer less job-related training than larger businesses. Municipalities in the Venice city-region could usefully study policies implemented in Japan to help older people find jobs and become better prepared for the later stages of their careers. Such policies include the establishment of elderly employment support centres that provide assistance to older workers interested in developing more flexible pathways to retirement. These services would need to be complemented by efforts such as information campaigns intended to overcome employers' reluctance to employing older workers. In Italy, as in the Netherlands, Belgium and Portugal, the employment rate for older workers is particularly low, at around 4% or less.

Connecting Venice, Padua and Treviso

Policy makers have responded through a series of metropolitan infrastructure projects …

A series of infrastructure projects seeks to transform this inchoate city-region into a linked, polycentric metropolis. In 2005, Veneto's policy makers launched the ambitious Regional Metropolitan Railway System (*Sistema Ferroviario Metropolitano Regionale*, or SFMR) to increase intra- and inter-city mobility. Metropolitan commuting has accelerated with the opening of the Mestre Bypass (2009), a 30 kilometre highway that operates as a beltway connecting Mestre to Treviso, and has reduced the travelling time from Treviso to Padua from 45 minutes to 20 to 25 minutes. Connectivity is projected to increase after the construction of high-capacity and high-speed services on the Padua-Mestre line, where Italian Railways seeks to increase services fourfold. Additional plans are under way to connect Venice's Marco Polo Airport to the rail system, given the meteoric growth in airline passengers (6.2 million more tourists used this airport in 2006 than in 1990).

…but a more synergistic metropolitan system is achievable

A more tightly connected system could optimise local supply chains, which often spill over multiple districts and afford economies of scale in relation to the provision of urban infrastructure, services and amenities. Enhancing connectivity could allow for a more efficient use of land and help create a downtown capable of exploiting the network effects of businesses in the Venice city-region. Although its industrial districts benefitted from locating in smaller towns, the services sector may need a downtown to bring together talented professionals. Mestre, part of the Venice municipality located on the mainland, could act as a hub and gateway to north-east Italy. Given its central location and large population, Mestre could become the key hub of a larger metropolis, taking advantage of the plentiful land available for redevelopment and the brownfields and vacant space available for re-use. New developments could benefit from Mestre's position as the central hub of Veneto's Regional Metropolitan Railway System. A series of initiatives has been launched to capitalise on Mestre's new place at the centre of gravity. Indeed, while the historic or "amphibious" Venice has lost two-thirds of its population since 1950, Mestre's population has more than doubled in size. If a metropolitan spatial vision informed mainstream public policy-making process, in policy formulation, implementation and evaluation, a synergistic urban system could result. A metropolitan vision has emerged in such areas as infrastructure planning, but it is still a novelty.

Re-urbanise cities in the Venice region by minimising land consumption and promoting high-density, transit-oriented communities

Sub-national governments can take a stronger stance against sprawl by prioritising transit-oriented developments and instituting fast-track development reviews for them. Several tools could be applied from increasing the density of urban development to

zoning reform. Incentives could be created to increase mixed-use developments that combine residential with non-residential land uses. Ultimately, such improvements could decrease commuting times, preserve rural land and reduce the costs of providing infrastructure.

Calibrating economic and spatial policy to safeguard the environment

Including watershed-related issues in economic development strategies would better protect Venice…

Governance mechanisms are not yet adequate to correct the impact of poor water management on economic development. Mechanisms worth considering would include improving information to more broadly assess costs and benefits, and linking this information to optimising management strategies (for example, by approaches of proposed development projects that impose costs on polluters). Including watershed-related issues in economic development strategies at the regional and sub-regional scale may reveal under-exploited opportunities. For example, riverways offer potential for transport and tourism, particularly on the mainland, and traditional lagoon fishery activities, largely abandoned in the 1980s due to environmental factors, could be revived. Economic development strategies could benefit from taking all aspects of rivers: as tourist attractions, transport links, and as ecological agents contributing to water purification and flood attenuation.

…land use planning and water governance need to be integrated…

Water governance could be improved by better implementing existing mechanisms for integrated water and land use planning, and making water quality and quantity a key part of land use decisions. Regional strategies for limiting the "ecological footprint" of supply chains (including limiting water use, controlling water quality, and spatial planning strategies intended to limit impacts on water resources) could be better developed and systematically applied. This would imply, for example, investigating the water conservation benefits associated with urban densification and industrial clustering, as in the case of industrial zones where complementary production processes promote re-use of water. Joint urban planning and water governance intended to reduce sprawl could help achieve density goals. For example, urban planning frameworks could include protocols in which water security considerations might impose constraints on land use through more stringent siting of industrial and commercial facilities. This would require new municipal planning processes for water resources and tighter articulation of regional and municipal planning. The revitalisation of islands in the Venice Lagoon, many of which are uninhabited, could also afford additional opportunities.

Implement watershed-based planning to safeguard water resources and the largest wetlands in the Mediterranean

Many of the required elements (such as watershed plans) already exist in the city-region's water governance structure, but some are not sufficiently implemented. It is essential that robust watershed plans are developed by all of the Veneto's eight watershed authorities (*autorità di bacino*) and implemented, and for protocols to be developed for the integration of watershed plans in regional and municipal development planning. In particular, the regional development plan (*piano regionale di sviluppo*) and the provincial territorial co-ordination plans (*piano territoriale di coordinamento provinciale*) could emphasise the need to prioritise the development and comprehensive implementation of watershed plans, especially the integration of land use planning processes and watershed security requirements. The creation of a centralised online water data repository for the Veneto is critical in order to pool historical data and facilitate integrated planning. This is particularly important for medium and long-term planning efforts responsible for adaptation to and mitigation of climate change.

Build upon existing multi-level co-ordination of water policy to improve service provision

Multiple authorities regulate water in the region through pumping plants, sluices and other hydraulic infrastructure in a highly complex hydrological system. This network surrounds the 550 square kilometres of the Lagoon, and is composed of 1 000 kilometres of channels, 200 kilometres of coastline, and a number of rivers that flow into the Lagoon or the Adriatic. Greater support for strategies for inter-agency co-ordination of water-related planning functions could economise service provision and maintenance. This might begin with voluntary and informal networking: for example, a regionally sponsored process providing incentives for the creation of inter-municipal sub-watershed networks organised on a hydrological basis, *e.g.* tributaries of the Sile River. These networks could address water quality and land use considerations, such as sediment and chemical loading into surface water sources. Efforts could expand upon the success of the consolidation of the water supply system in the Venice city-region. The "bulk" water supply system was consolidated in 2007 from four water suppliers into a single corporation (*Veneziana Energia Risorse Idriche Territorio Ambiente Servizi*, or VERITAS), which is owned by 25 municipalities and acts as a bulk water supplier to 18 municipal water providers.

Metropolitanise an economic and environmental agenda

Two ways to improve governance of the polycentric Venice city-region

The implementation of these economic and environmental policy goals requires adaptation of governance arrangements in the Venice city-region, which has morphed into a polycentric entity. Polycentricity poses challenges for regional environmental sustainability and economic development, including cultural infrastructure and public transit, and requires increased regional strategic planning. Strong institutional fragmentation in the Venice city-region, which is comprised of 243 municipalities, adds

an additional layer of complexity and puts pressure on intergovernmental co-ordination. In order to improve policy design and implementation, governance arrangements could be improved in two ways: stronger co-ordination between the region and local governments in the Venice city-region, and expansion of inter-municipal co-operation.

First, increase vertical co-ordination between the Veneto Region and municipalities…

Considering the relatively powerful positions of Padua, Treviso and Venice, a need for increased vertical co-ordination with the Veneto is called for. A common strategic agenda and sector-specific vertical agreements, as applied in other metropolitan areas in the OECD, are instruments that could be applied more frequently in the Venice city-region. Co-ordination might be strengthened by the introduction of performance standards, diffusion of best practices of area-wide policy and service agreements, and the facilitation of experimentation and pilot projects in area-wide policy co-ordination and service provision. The current Territorial Development Strategy could be extended to include economic development, such as innovation, skills and social integration. The Region might also direct more investment, incentives and support to programmes that stimulate metropolitan alignment and co-operation.

…especially through co-ordinated land use planning

Internal contradictions and frequent exceptions (*deroghe* and *varianti parziali*) weaken many of the plans approved in the Venice city-region. Though governments throughout the OECD accept variances to official plans in exceptional circumstances, these have been permitted excessively in the Venice city-region. For example, though the 1985 regional plan contained provisions to protect the traditional rural landscape, its power was diluted by Veneto Region Law 24/1984, which facilitated sprawling new rural developments. Likewise, despite the good intentions of the Veneto Region Law 11/2004, which established rules to promote development consistent with environmental sustainability and densification, conflicting developments are accommodated in many amendments to existing municipal plans (*piani regolatori generali*). Though Regional Law 11/2004 created a new municipal development instrument, the Structure Plan (*piano di assetto del territorio*, or PAT), to outline strategic policies for the layout of municipal areas, the PAT process is largely disconnected from the urban development policies enshrined in the provinces' territorial co-ordination plans.

Second, extend existing inter-municipal co-operation…

Inter-municipal co-operation in the Venice city-region has increased over the last decade. In 2007, the mayors of Venice and Padua signed a protocol of understanding to exploit economic complementarities and expand functional connections. Numerous inter-communal plans among rural municipalities and joint services provision in utilities provide other examples of inter-municipal co-operation. Similar co-operative processes have emerged in the transport sector, such as the creation of the special administrator for Mestre's Beltway, who can act as the sole representative of all the competent organisations from the different areas, and the Company for Integrated Transportation in the Veneto (*Società dei Transporti Integrati del Veneto*, STIV), which aims to create a

public transportation system in the Venice-Padua-Treviso metropolitan area. The Venice city-region could build on the example of these recent experiments to expand inter-municipal co-operation in economic co-operation and environmental planning.

…through pilot projects in the cultural and tourism sectors

A metropolitan approach could provide clear benefits in the cultural sector. The three provinces have engaged in some co-ordination of cultural infrastructure, but additional programmes are warranted. Action is especially needed for the museums in historic Venice, given the limited space available to them and the exorbitant costs of archiving their collections. A project could be devised to provide an integrated storage facility on the mainland to house the archives on historic Venice and exhibit the collections elsewhere in the city-region. A regional tourism policy has the potential to encourage visitors to travel outside the mass tourism circuit and extend the tourist season beyond the peak periods. An explicit regional tourism policy could also entail the creation of a metropolitan tourism observatory such as that in Vienna. Changes in tourism statistics have implications for city operations, and more accurate data could better inform policy making. In 2009, the inclusion of commuters, tourists, students and other individuals into a population estimate would have increased the historic centre's user population to 143 000 people, or approximately 83 000 more inhabitants than the official number of residents.

…and inter-city joint flagship projects

Establishing a think tank to facilitate the emergence of flagship projects might also be considered. This could concentrate on defining possible synergies between tourism and other important sectors within the Venice city-region, and the role that flagship projects could play. An eventual bid for the 2020 Olympics, as announced by politicians from the Veneto Region in October 2009, would only increase the need for regional co-ordination with respect to tourist infrastructure. The same applies for Venice's bid to be recognised as the European Capital of Culture in 2019. Such joint projects, combined with smaller events and fairs, could help build a metropolitan identity and neutralise the localism (*campanilismo*) and historical rivalries among municipalities in the city-region.

Respond to environmental issues, especially climate change, with metropolitan approaches

A metropolitan approach would increase the effectiveness of the response to environmental issues and climate change. Carbon-relevant functions, flows of materials and energy, and transportation overlap across municipal jurisdictions. Climate change adaptation policies specifically need to be decided and implemented at a regional scale, especially given Venice's hydrological complexity. Authorities could adopt and tailor metropolitan-level climate change action plans, most notably those developed in London, Hanover and Portland. Local governments in the Venice city-region could also mainstream climate change considerations into the policy-making process, given that their environmental policy is mainly confined to environmental departments. Policies that might be considered include: a climate-policy steering group, an office of climate protection initiatives, or an inter-agency unit to mainstream climate change policy.

Create an integrated transit system led by a metropolitan authority …

Sustaining efforts to create a metropolitan transport system with regionally co-ordinated services and unified fares could improve inter-city mobility as well as efficiency in the transit system. To remain competitive, polycentric regions such as Venice require sophisticated public transport systems built upon a polynodal network, rather than on the classical radial model of monocentric cities. Most of the local public transport companies are now below the optimal size to allow for full exploitation of economies of scale and density. For instance, no fewer than 39 local operators offer bus services in the Veneto. This extreme fragmentation calls for merging firms operating in adjacent territories, in the case of small and medium cities, and for disaggregating services in the larger cities. Significant institutional designs have been crafted in several OECD metropolitan areas to achieve these objectives, as in Frankfurt and Vancouver. Ongoing efforts to create a metropolitan transit body should be sustained.

… and prepare a strategic debate on more radical options, including the formation of a metropolitan city ("città metropolitana")

More radical governance options in the Venice city-region might be needed, for which a strategic debate could be formulated. Co-operative agreements tend to be issue-based (water, waste management, etc.) rather than metropolitan and involve a limited number of parties, usually two to three municipalities. Serious reflection based on cost-benefit and sensitivity analyses is needed to assess the tools the Venice city-region could employ for its metropolitan future, such as a metropolitan government. The possibility of creating metropolitan cities was introduced in Article 114 of the 2001 Italian Constitution. However, this has not been translated into concrete legislation, and no metropolitan city has so far been created. Considering the mixed outcomes of creating new institutions and regional and local government mergers in other OECD countries, an assessment of the potential value added of institutional reform in the Venice city-region would be necessary. The merging of local utilities in many OECD countries has produced cost savings for consumers, and future attempts at reform merit reflection informed by estimates of potential gains in efficiency. Consumer savings in utility prices could generate additional support for ambitious metropolitan governance structures.

A metropolitan strategy is needed to build a more resilient system

A better-connected metropolitan system – through political co-operation and improved infrastructure – would offer the Venice city-region more resilience to economic adversity and rapid change. Improved environmental management at a metropolitan level could be better aligned with an ecosystem-based approach, to protect against the impacts of climate change and rising sea levels in particular. Ultimately, effective public intervention depends on a resourceful system of metropolitan governance, which can dedicate resources to these questions and confront them in systematic and co-ordinated ways.

Chapter 1

Towards a resilient and integrated metropolitan economy

Through a global comparative framework, Chapter 1 assesses the competitiveness of the Venice city-region, defined as the totality of the provinces of Venice, Padua, and Treviso along with the 550 square-kilometre Venice Lagoon. A historical section reviews how the Venice city-region has evolved towards a polynodal area composed of a series of connected small towns, rural areas and the cities of Padua, Treviso and Venice. Commuting flow data is presented along with data on the spatial dimensions of economic relationships, infrastructure, ecology and political geography in the city-region. Metropolitan economic trends are reviewed and benchmarked, including GDP per capita, labour productivity growth, participation rates, patenting, employment and unemployment rates. Demographic changes are also assessed: Chapter 1 reveals how rising life expectancy, low fertility and an early pension age have increased the dependency of seniors on the working-age population. Immigration data are presented, which attest to a steady rise. Such changes are occuring amidst a profound economic re-organisation in Veneto through a shift towards highly knowledge-intensive products and a growth in commuting within the Venice city-region. Infrastructure deficits are highlighted and underlie constraints in the mobility of the regional labour force and the consolidation of metropolitan-wide inter-firm linkages. Finally, the chapter assesses the environmental concerns stemming from Venice's unique combination of hydrological vulnerability, urban sprawl and heavy industry. Metropolitan resiliency would benefit from an integrated approach involving economic, environmental and governance contributions.

Introduction

Through a global comparative framework, this OECD Metropolitan Review assesses the competitiveness of the Venice city-region, defined as the totality of the provinces of Venice, Padua, and Treviso along with the 550 square-kilometre Venice Lagoon. This assessment provides the evidence base for policy recommendations to help build a more inter-connected city-region resilient to change – both climatic and economic. The Review contains four chapters, which *i*) evaluate the city-region's economic performance; *ii*) identify policies that could bolster its productive framework; *iii*) examine environmental governance, especially water policy; and *iv*) describe supportive government arrangements in the context of the region's polycentric character. This Review evaluates the Venice city-region at an opportune moment given the ongoing improvements in the metropolitan infrastructure, which are designed to transform a somewhat disconnected and "centre-less" city-region into a more tightly connected metropolitan area. It is hoped that the Review will inform debates as this inchoate city-region develops and takes shape.

The Venice city-region has become a powerful reference for city regions in transition. Throughout the OECD and beyond, it provides a model of the opportunities and challenges that an export-oriented economy can face in the context of globalisation, especially for small and medium-sized companies. It offers useful insights into the impact of laissez-faire urban planning and into how city-regions can enhance their urban density. The Veneto's physical geography and susceptibility to flooding are unique, but it presents some helpful lessons for local governments eager to develop "green" infrastructure to adapt to climate change. Finally, given the high degree of decentralisation and the 243 municipalities in the Venice city-region, the case affords important examples of multi-level governance and economic co-operation.

A city-region in transition

The Venice city-region accounts for 3% of Italy's GDP and concentrates on intermediate goods and niche markets. Located in the Veneto Region 240 kilometres east of Milan and 300 kilometres south of Munich, the Venice city-region has 2.6 million inhabitants, the largest wetlands in the Mediterranean and one of the most heavily visited areas in the world. Though some of its sectors have been more successful than others, its economic expansion in the late twentieth century is legendary in the field of economic development and is often referred to as the "Veneto miracle". In 2009, the Venice city-region comprised 54.4% of Veneto's population and in 2006 accounted for 54.5% of its value added (ISTAT, 2006, 2009a). In 2006, its GDP per capita (USD 32 941) was roughly equal to that of Madrid or Melbourne, and in 2008, its official unemployment rate stood at 3.5%. The 39.5 million tourist visits to the city-region in 2008 testify to its international appeal.[1]

Businesses in the Venice city-region have managed to modernise their traditional strengths in textiles, tourism and footwear, using an export-oriented strategy. The Venice city-region accounts for 23% of all national exports and for more than 40% of Italian luxury goods sold abroad.[2] Manufacturers have taken advantage of an increasing global demand for "Made in Italy" luxury and specialty goods. For example, Montebelluna's boot industry produces 75% of all ski boots and 50% of the world's technical hiking and climbing apparel. A network of subcontractors producing highly specialised clothing provide the stitching and finishing for companies such as Benetton, which is based in the

Venice city-region. This has been achieved, in part, through an unusually rich entrepreneurial landscape, boasting one firm for every ten inhabitants. Businesses of less than ten workers account for 93% of the companies based in the city-region, offering a flexible network responsive to shifts in consumer trends.

Policy makers in the Venice city-region know that the city-region cannot depend only on its reputation to attract and sustain businesses, and have been actively engaged in identifying its vulnerabilities. While entrepreneurs have taken advantage of cheaper labour and relocated relatively low value-added production technology to Eastern Europe and beyond, it is not clear whether there is a balance between outsourcing and activities retained within the region. Policy makers have trumpeted the creation of a new knowledge economy, but only 9.5% of the city-region's labour force has a tertiary degree. Serious concerns remain over the region's comparatively low activity rate for women and older workers, over socio-economic integration of immigrants, over its under-performance in technological innovation linked to universities, its inadequate inter-city transport connections, and its fragile physical and hydrological environment. Thanks to its *acqua alta* (high waters), the historic centre has a reputation as one of the most ecologically sensitive regions in the world, and in response, Italy's largest infrastructure project, a EUR 4.68 billion flood barrier system encircling Venice, is under construction. At this juncture, the stakes are high for a new economic strategy capable of achieving goals of economic renewal, historic conservation and sustainability.

With the goal of a refined economic, environmental and governance strategy in mind, this chapter provides a profile of Venice city-region's leading trends and offers an analytical framework for future policy recommendations. After defining the city-region and critically assessing its economic history in the past 50 years, the chapter assesses the state of the labour market and provides evidence of informality and low university-linked innovation, which call into question the long-term sustainability of the model. Given the global nature of the economy, key indicators will be benchmarked to the 78 metro-regions with more than 1.5 million inhabitants included in the OECD metropolitan database for a comparative analysis. The chapter then assesses the degree to which current infrastructure improves the regional labour market, inter-firm linkages, agglomeration economies, and interconnectivity between the provinces of Venice, Padua and Treviso. Finally, given the importance of the environment, the city-region's hydrological insecurity is discussed, along with its long-term vulnerability to the effects of climate change.

1.1 The emergence of a city-region

Geographical borders and intra-urban linkages

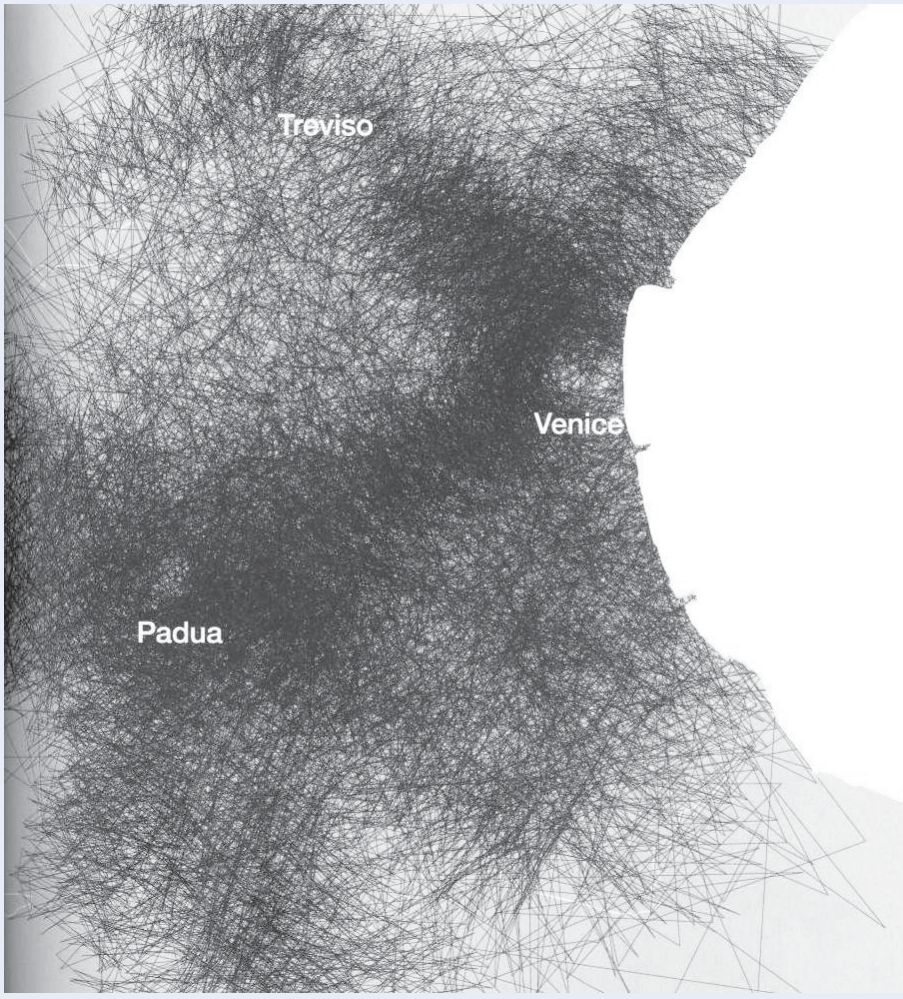
The Venice city-region has evolved towards a polynodal city-region composed of a series of connected small towns, rural areas and the cities of Padua, Treviso and Venice. The concept of a city-region is not in general currency in Italy, and only recently has the notion of the urban space economy been reintroduced into public policy debate. Though at times a functional city region may be confined to existing administrative borders, it most often extends across multiple boundaries.[3] These spaces, in turn, are not consistent with the commuting area, which tends to be narrower. Responding to these concerns, the OECD adopted a definition that incorporates overlapping economic, political and ecological spheres (Box 1.1).

Box 1.1. **Defining the Venice city-region**

This definition encompasses the spatial dimensions of economic relationships, infrastructure, ecology and political geography.

Economic interactivity. The range of economic functionality of a city-region is sometimes calculated using commuter ranges as a proxy for defining the geographical extension of the territory. In the case of Venice, commuting data indicates a compact core well endowed with infrastructure, which facilitates flows of workers and students. Commuting patterns reveal a dense core spanning Venice, Treviso and Padua. They also illustrate that commuting flows are weaker in the southernmost part of the area (the southern part of the provincial districts of Padua and Venice), as well as in the northernmost part of the area (the Treviso foothill district). Despite their widely acknowledged connectivity, these patterns cannot be quantified, given the absence of a regional transport analysis of commuter origins and destinations. Since it is not possible to link labour markets and employment nodes within the region, an exact demarcation of the region in terms of transport flows is not possible.

Commuting flows within the Venice city-region:
Flows with 100 cars commuting per day



Source: Adapted from Scheppe, W. and IUAV Class on Politics of Representation (2009), *Migropolis. Venice: Atlas of a Global Situation*, Hatje Cantz/Fondazione Bevilacqua la Masa/Comune di Venezia, Venice, based on Regione Veneto Regional Statistics System Management data. All the sources of the data are available at: *http://statistica.regione.veneto.it/venetoViewer/StartMapViewer?type=TAB*.

Box 1.1. **Defining the Venice city-region** (*cont.*)

Transportation. The city-region's two airports, in Venice and Treviso, along with road networks, airport, freight rail and pipelines, all play a crucial role in facilitating regional economic activity. As a coastal area, a tourist centre and an agro-business node, freight movement across the city-region is significant and forms a critical framework around which the functional economy operates. Recent infrastructural improvements have created a more highly connected urban structure and have given concrete form to this territorial concept. These include the Mestre Bypass (*Passante*), which has increased Mestre-Treviso commuting flows. Already the flows between Padua and Venice are strong given the highway connection and frequent rail service. Connectivity is projected to increase after the construction of high-capacity and high-speed services on the Padua-Mestre line. The Italian Railways is planning to increase services fourfold on this line.

Ecology. The city-region is bounded to the north and east by the Alps and to the east and south by the Adriatic Sea. Arguably the most important ecological element defining the region is the shared resource of water: the Venice Lagoon is the largest wetland in the Mediterranean and includes more than 1 000 kilometres of channels and a number of rivers[1] that flow into the Lagoon. The total surface area of the Lagoon is about 550 square kilometres, which dwarfs the 7.6 square kilometre historic centre of Venice. Beyond the historic centre, the Lagoon includes 116 other islands, many of which are uninhabited. The Venice Lagoon has a diverse ecosystem, covering dunes, salt marshes, shoals, marshes, seagrass meadows, reclaimed areas, fish farming valleys and freshwater swamps. Outside the Lagoon, the city-region encompasses Alpine foothills and plains. Given that the region is susceptible to rising sea levels and increasing temperatures, an ecosystem approach is all the more imperative.

Political. An administrative definition of the city-region offers several advantages for both empirical analysis and policy making, reflecting practical administrative capacities, voting jurisdictions and spatial planning districts, which are all central to the urban development agenda. However, more detailed definitions, such as those which remove particular outlying municipalities in Padua, Treviso and Venice and add municipalities in neighbouring provinces or regions, do not provide much statistical utility and are generally short on documentation.[2] There may also be less political traction for economic development policy if functional region definitions at this level of precision are not contiguous with political units. On the other hand, a functional definition can take into account the long-standing political dialogue in the city-region, which formally dates back to the early 1990s, when the term PATREVE (PAdua, TREviso, VEnice) was coined (see Costa, 1991). The 243 municipal councils within this city-region (104 in the province of Padua, 95 in the province of Treviso and 44 in the province of Venice) have engaged in co-operative projects that justify a metropolitan approach.[3]

Notes:

1. These include the Brenta, Piave, Sile, Bacchiglione, and Po rivers.

2. One such definition excludes some remote municipalities in PATREVE and includes the area around the town of Adria (part of the province of Rovigo) and the municipality of Pordenone, which is located in the Friuli-Venezia Giulia Region. Using this definition, the metropolitan area would cover 3 889.1 square kilometres and contain a population of 1 764 071 inhabitants. For an older conceptualisation see Piasentin *et al.* (1978).

3. Exceptions, however, include at least two large areas are less vested in the process of regional interconnectivity: the Alpine foothill area (Bassano – Castelfranco – Conegliano) and the Lower Padova plains area (Este – Montagnana).

Following this multi-criteria approach, the proposed boundaries of the Venice city-region include the three provinces of Venice, Padua and Treviso, which together contain a total of approximately 2.6 million inhabitants. According to the OECD's definition of metropolitan regions,[4] Venice cannot be considered a true metropolitan region because it does not have an urban core of more than a million inhabitants. However, it does satisfy key components of the definition, mainly its metropolitan population size (more than 1.5 million inhabitants), and a commuting rate of 1.03, which is lower than the OECD limit of 1.1. Intra-metropolitan commuting is likely to increase given the effects of the Mestre Bypass, which opened in 2009 and has reduced the duration of a trip from Treviso to Padua from 45 minutes to 20 to 25 minutes (Regione del Veneto, 2009a). Intra-firm

commuting will also benefit from the impact of several ongoing metropolitan infrastructure projects, particularly the Regional Metropolitan Railway System (SFMR), which will help the Venice city-region develop a self-contained labour market. These limitations aside, the Venice city-region ranks in the lowest quartile of OECD metropolitan regions in terms of population size and in the lowest third in terms of density in the metropolitan database (Figure 1.1). Economic inter-relationships, commuting flows, the integration and exchange of functions and services among urban centres, and common environmental features all justify a regional approach.[5]

A triangle of three medium-sized cities – Venice, Padua, and Treviso – shapes the city-region and is surrounded by hundreds of small towns, which sprang up spontaneously, not as the result of any strategic urban planning. Although the municipality of Venice boasts the largest district in the area, with a total population of around 270 000, the two other leading municipalities are by no means small: 210 000 in Padua and 80 000 in Treviso. Besides these main centres, the region features other conurbations that house industrial clusters and provide solid employment opportunities, namely the area including the municipalities of Vittorio Veneto and Conegliano (north of Venice) and the Castelfranco Veneto/Montebelluna area (northwest of Venice), both of which fall within the province of Treviso (Figure 1.2).[6]

Though the Venice urban system constitutes the central scale of analysis of this Review, three additional scales will be used for complementary analysis.

1. **At the provincial scale.** The review will refer to the three provinces of Padua, Treviso and Venice. From a socio-economic perspective, the provinces have profoundly different traditions and specialisations. Venice is renowned as a popular tourist destination and serves as the seat of the Veneto regional government. Padua, with its nearly 800-year old university of 63 000 students, is a national leader in higher education and in scientific and technological research. Its staff of nearly 5 000 researchers cover most disciplines,[7] and a growing number of firms have been incubated by the university, especially in the fields of life sciences and nanotechnology. Treviso boasts manufacturing firms and serves as the headquarters for some of the largest clothing companies in the world, most notably Benetton. Culturally, the three provinces have clearly recognisable identities and have always striven to maintain their individual visibility, in spite of Venice's international prominence.

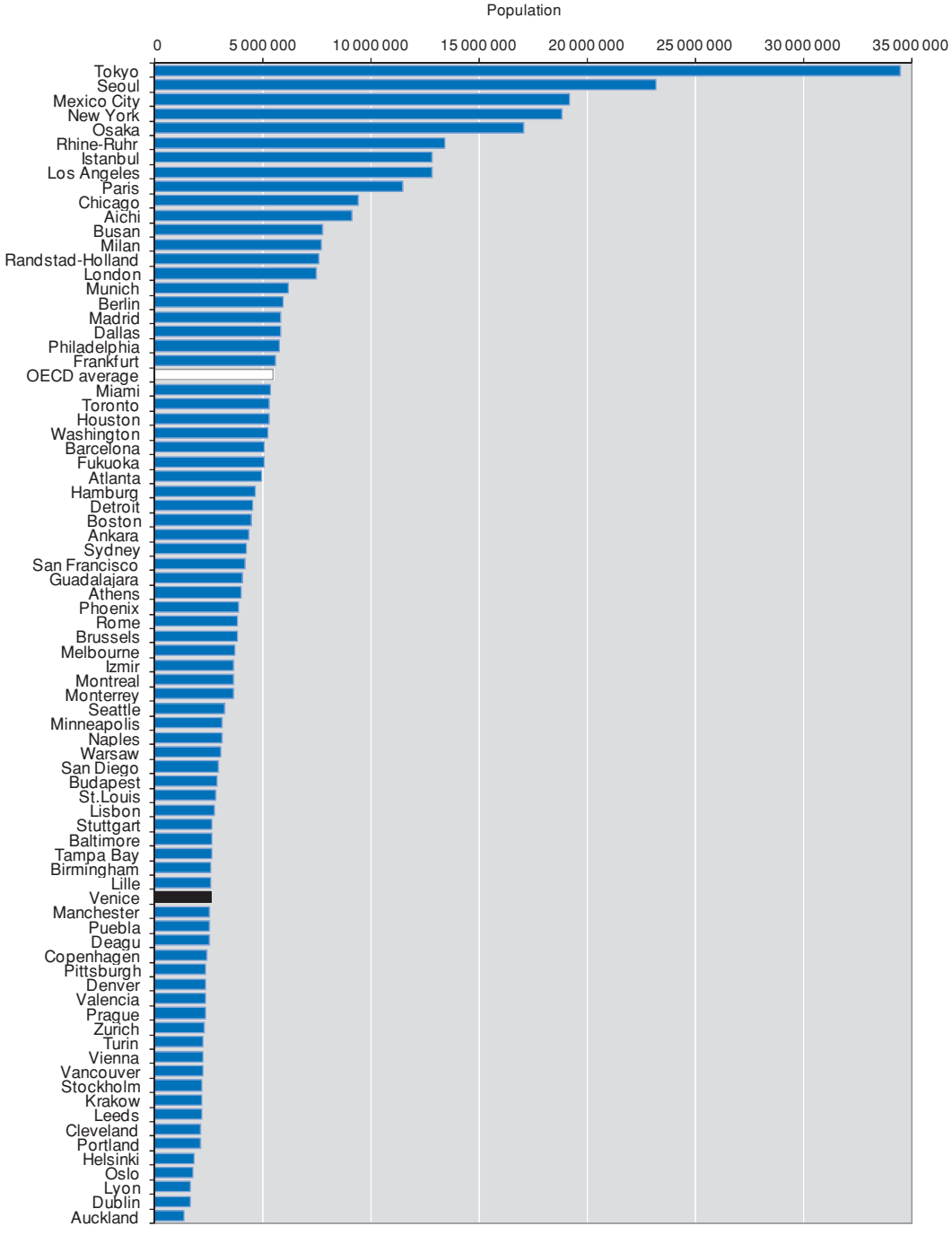
2. **At the regional scale.** The Review will reference the Veneto Region, which encompasses both the trio of provinces mentioned above and the provinces of Belluno, Rovigo, Verona and Vicenza. This is especially useful given that for some fields, such as transportation statistics, data is available at the regional and not at the provincial level. The Venice city-region accounts for 54.4% of Veneto's population (2009), 53.5% of its labour force (2003), and 54.5% of the Veneto's value-added (2006). The Veneto covers 6.1% of the land area of Italy and includes 8.1% of its population (Table 1.1).

3. **At the sub-municipal scale in Venice.** For particular issues, such as a discussion on housing issues and environmental vulnerability, it is necessary to consider the unique characteristics of amphibious Venice. Amphibious Venice includes the famed historic centre (*centro storico*) of Venice (Figure 1.3), which itself accounts for 60 000 residents along with the archipelago of islands in the Lagoon, such as Lido, Burano, Pellestrina, Giudecca and Murano, among others. These islands, including historic Venice, have approximately 93 000 inhabitants, while mainland

Venice (Mestre) contains 176 000. The municipality of Venice is the most populous in the Veneto Region, most of whose municipalities have less than 10 000 residents.

Figure 1.1. **Ranking of metro-regions by population size, 2005**

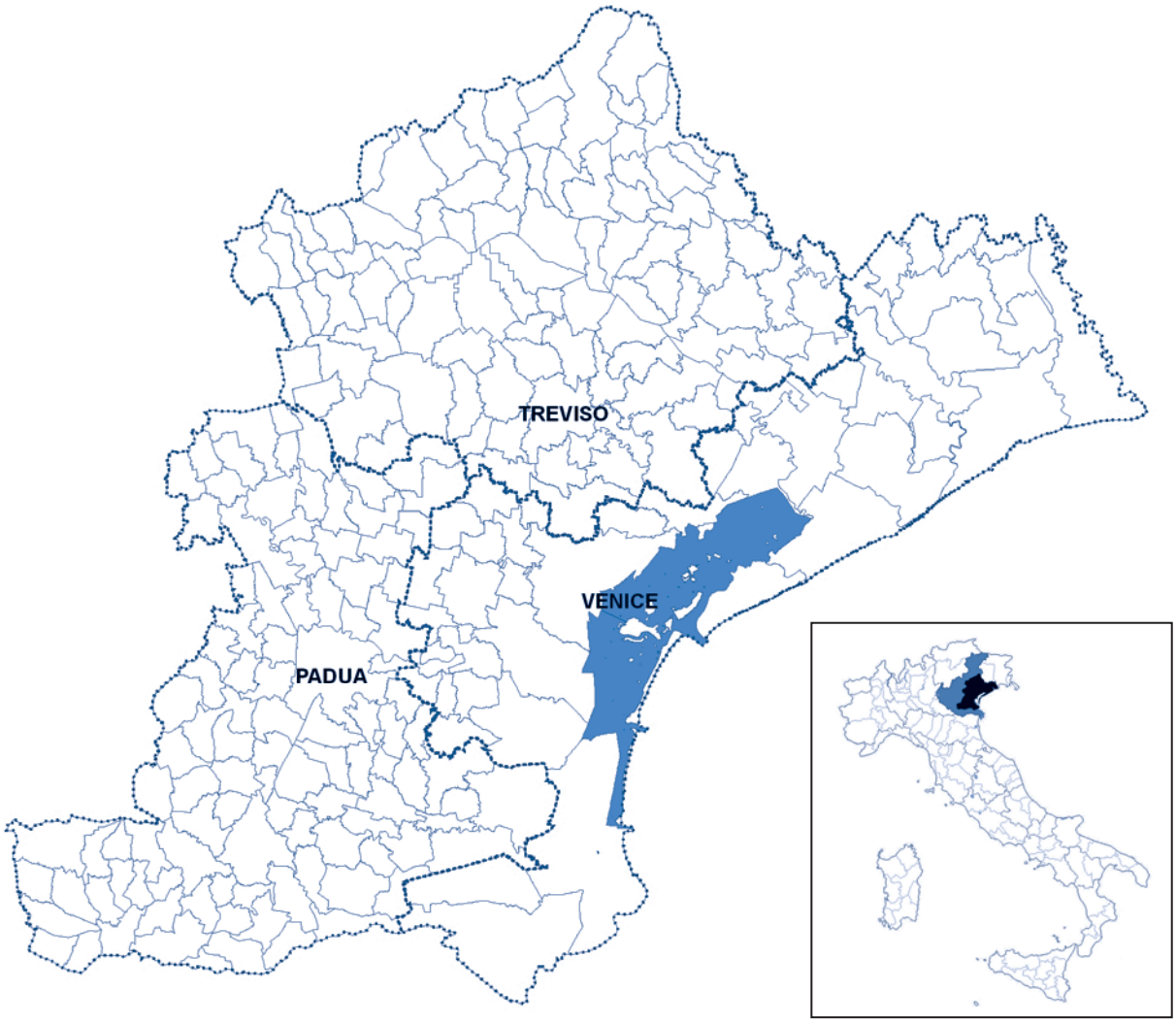
OECD sample of 78 metro-regions and Venice



Note: OECD average refers to the average of OECD metro-regions.

Source: OECD Metropolitan-Regions Database, internal database.

Figure 1.2. **The Venice metropolitan region**



Note: In the inset map, Veneto is in grey and the Venice city-region is in black.

Source: Map provided by Regione del Veneto and processed by the Fondazione di Venezia.

Table 1.1. **Key indicators of the Venice city-region, 2005**

	Surface (km^2)*	Population	Labour force	GDP pc (USD)	GDP (USD billions)
Padua Province	2 141	886 792	403 378	29 448	30.11
Treviso Province	2 477	869 534	844 044	31 103	27.14
Venice Province	1 957	830 872	367 949	30 620	27.13
City-region	**6 575**	**2 561 708**	**1 164 851**	**32 941**	**84.39**
Veneto Region	18 391	4 719 132	2 154 522	32 735	154.48
Italy	301 388	58 607 043	24 451 393	27 750	1 626.33

Note: * The surface (in km^2) of the Venice provincial district does not include land covered by water. The municipality of Venice has 268 993 inhabitants (2008) and covers 157 km^2.

Source: OECD Regional Database, internal database.

Figure 1.3. **Historic Venice**



Source: NASA (2004), "Earth Observatory Image of the Day. Grand Canal, Venice", *http://earthobservatory.nasa.gov/images/imagerecords/4000/4582/venice_iko_2001092_lrg.jpg*.

From a poor agricultural region to an innovative, export-oriented economy

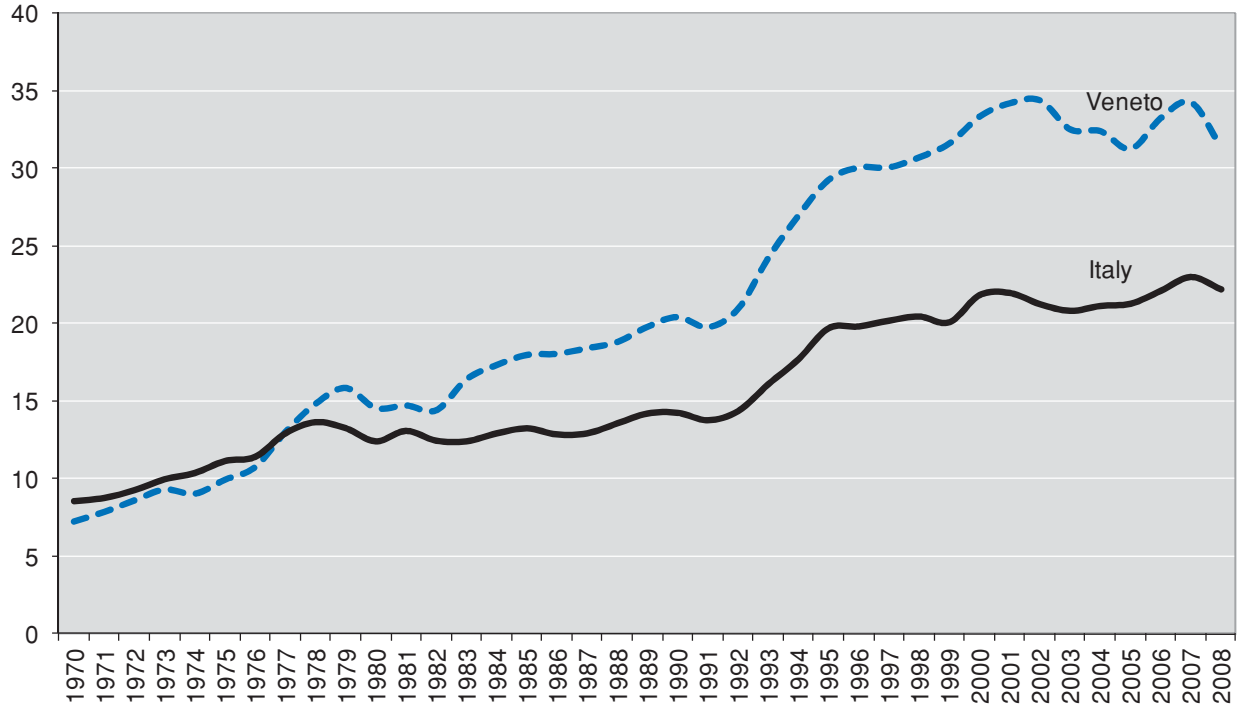
The polynodal Venice city-region emerged from a long process of economic restructuring, which turned a poor, mainly agricultural area into an innovative, export-oriented economy with a decentralised mode of production. While the first phase of industrialisation in the 1950s and early 1960s benefited from the availability of low-cost labour and through the return of skilled emigrants, the 1970s witnessed the creation of a new model often referred to as the "Third Italy" (Bagnasco, 1977). Within this framework, the city-region fostered a network of small industries that worked as subcontractors, offering an extraordinary variety of products and skilfully interpreting the needs of consumers and the shifts in their tastes.[8] These small businesses offered a number of advantages, including "practically negligible overhead costs, no need to pay taxes or contributions on the work of family members to the state" (Bialasiewicz, 2006) and a capacity for innovation enhanced both by the proximity of many entrepreneurs engaged in similar activities and by an extensive collaboration between skilled workers, management and technicians within each firm (Brusco, 1982).

Manufacturing by SMEs was complemented by a more intensive use of high-tech processing and a contraction of heavy industry. By the mid-1970s, Veneto as a whole produced the second-highest industrial output in Italy, mainly thanks to several mid-size industrial centres, which specialised in ceramics, optical lenses, furniture, leather, stonework and machinery for shoe manufacturing (Piccinato, 1993). The region quickly evolved towards an export-oriented model: while in 1970 less than 10% of the Veneto's GDP could be attributed to exports, by 2000 over 35% derived from exports (Figure 1.4).

However, not every industry was able to compete internationally. The petrochemical industry of Port Marghera, established in the 1920s in a ward (*frazione*) of Mestre, began a rapid decline in the 1960s, as the countries supplying the primary raw materials began to establish their own refining facilities. This was aggravated by the abandonment of a plan to expand Port Marghera, which was rejected after the floods of 1966. Disconnected from the regional economic infrastructure and no longer competitive after the 1973 oil crisis, a large number of petrochemical firms soon closed their factories.[9] Port Marghera employed approximately 33 000 workers in 1965, but by 2002, only 12 000 remained (Piovene and Türetken, 2007).

Figure 1.4. **Veneto: a model of an export-oriented economy, 1970-2008**

Percentage of GDP sourced from exports



Source: ISTAT (various years), processed by *Unioncamere del Veneto* (2009), "Veneto Congiuntura. 2.2009", *www.veneto.congiuntura.it/upload/Documents/VenetoCongiuntura2trim.2009.pdf.*

Low-density, sprawling developments were a by-product of Veneto's decentralised production, which favoured SMEs and mini-factories in rural areas. With minimal enforcement of land use controls and inexpensive land, residents converted rural into industrial or commercial areas, and many developed family-based businesses on the side. Many of these small businesses grew into mini-workshops or *capannoni*, which grew in capillary fashion throughout Veneto (Bialasiewicz, 2006). Residents relocated to municipalities on the urban fringe of cities and depopulated urban poles. Indeed, while the population of edge municipalities grew by 1.52% from 1976 to 1979, the urban poles contracted by -0.06% (IRSEV, cited in Piccinato, 1993). A dense network of roads connected the micro-agglomerations of *capannoni* and single-family homes (*villette*), which developed into what many Italian urbanists refer to as *città diffusa*, or an "urbanised countryside" model (Indovina *et al.*, 1990; Riera i Figueras, 1998;

Marson, 2001; Cosgrove, 2006). This settlement pattern was actively encouraged by the Veneto government, whose Law 24/1985 supported the construction of buildings and the diffusion of industrial areas not only in peri-urban, but widely in the rural territory, as described in the *OECD Rural Policy Review: Italy* (2009a). Consequently, the region's diffused entrepreneurial capitalism became even more spatially scattered. Today, it has been described as a region suspended between a dying rural world and a nascent Los Angeles (Paolini, 1999, cited in Bialasiewicz, 2006). Rather than re-centre the city-region, its famed "Third Italy" model resulted in a massive centrifugal development.

In late 1980s and early 1990s, Veneto's productive system evolved as entrepreneurs internationalised their supply chains. This entailed the development of international distribution systems, a network of foreign suppliers, and the relocation of production to other countries. Entrepreneurs took advantage of cheaper labour costs and relocated more rudimentary production technology, such as simple stitching machines. Initially, the Veneto's companies relegated some tasks to Eastern Europe – Romania, Bulgaria, and Albania – and later to Asia. As a result of these changes, the model acquired several advantages, including niche marketing strategies, a high level of sales internationalisation, and an advanced production flexibility both in fast volume and mix adaptation (Camuffo *et al*., 2002; Chiarvesio *et al*., 2010).

1.2. Economic trends

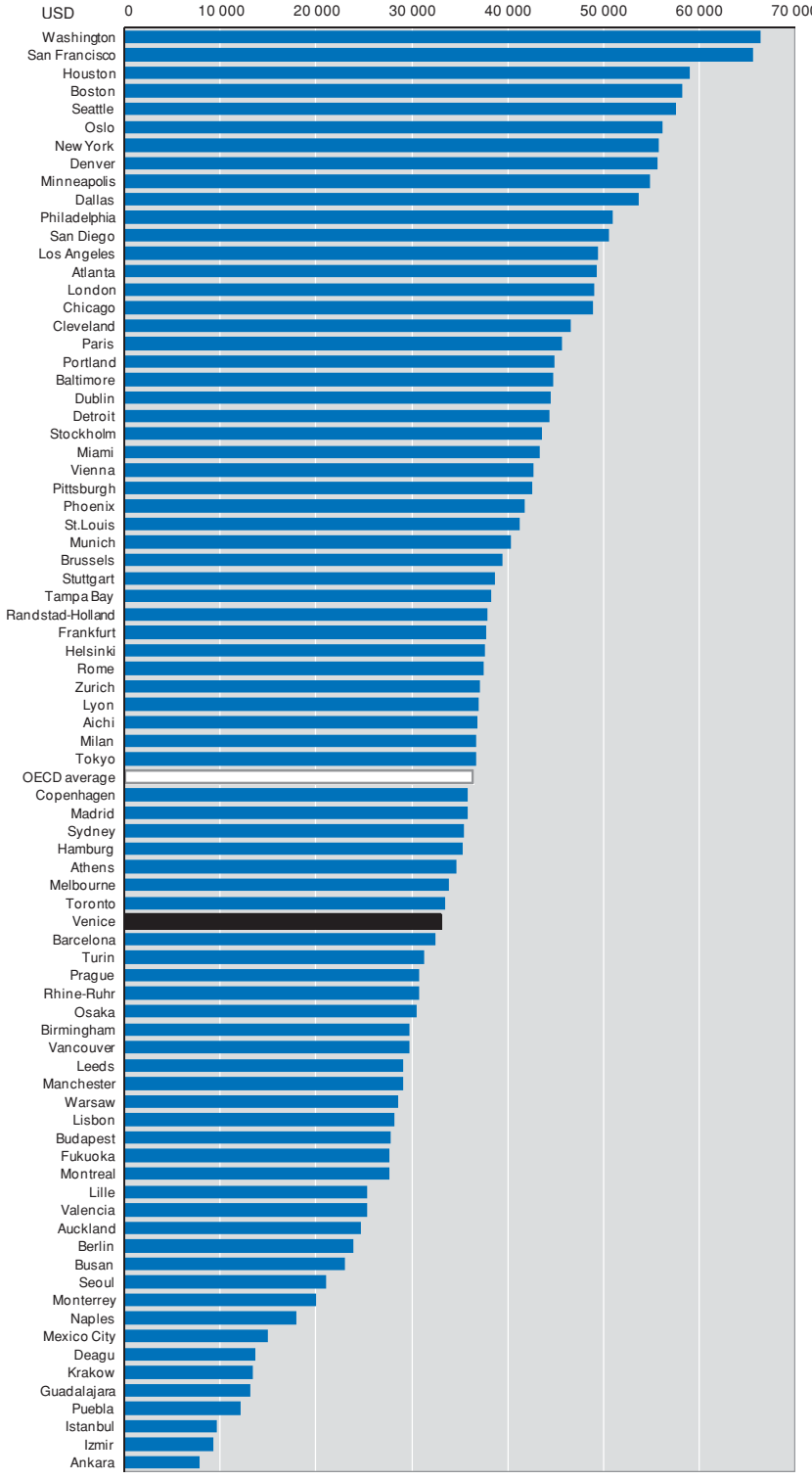
Understanding the economic reality of Venice requires careful analysis, to distinguish between what can be seen in the data and the underlying facts. In particular, the sizeable informal economy in the Venice city-region raises some questions about the data concerning improved economic performance. On the surface, Venice seems prosperous, dynamic, attractive and productive. A closer look reveals a somewhat more nuanced picture.

Venice on the surface

A booming economy

The Venice city-region has emerged as an important growth pole in Italy and has outperformed many metro-regions internationally. Venetians are richer than the average Italian, and Venetians are also at least as rich as a number of European and North American cities. Per capita GDP in 2005 for the Venice city-region was 20% greater than the national average, and although still slightly under the OECD metro-regional average, as rich as Toronto or Barcelona and more affluent than cities of similar size, like Manchester and Lisbon (Figure 1.5). The Venice city-region was among the most dynamic OECD metro-regions, growing at more than 3% annually over 1995-2005. In fact, its dynamism can be compared to that of London, Stockholm or Houston, which places it in the top ten performers in Europe in terms of economic growth (Figure 1.6). An important caveat, though, is that global recession may have undercut some of the gains in the 1995-2005 period. This Review relies on many data sources from Italy and OECD member countries which were released before the recession and therefore do not directly address the impact that the current financial crisis may be having on the Venice city-region. As with many other city-regions, the crisis has affected industrial production in the area. For example, Veneto's industrial production in the second quarter of 2009 fell by 19.5% from its level in the second quarter of 2008. The province of Padua was even harder hit, and its production decreased by 27.9% during the same period (*Unioncamere del Veneto*, 2009).

Figure 1.5. **Per capita GDP among OECD metro-regions (PPP at current prices), 2005**

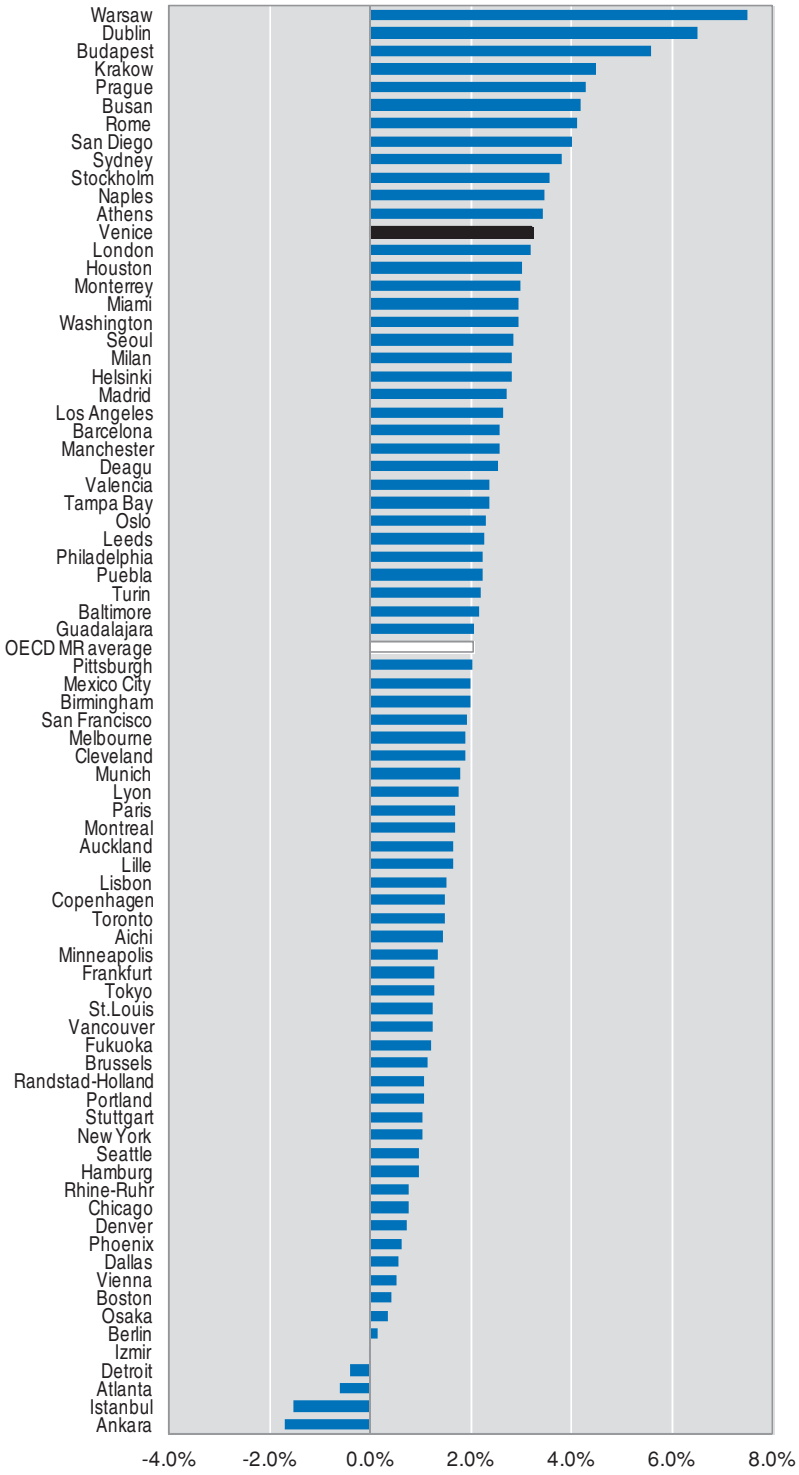


Note: Data for Australian and Mexican metro-regions refers to 2004, whereas Turkish data refers to 2001. Data for Auckland refers to 2003, and the Zurich data constitute a calculation for 2002.

Source: OECD Metropolitan Database, internal database.

Figure 1.6. **Economic growth among OECD metro-regions**

Average annual growth rates (1995-2005)



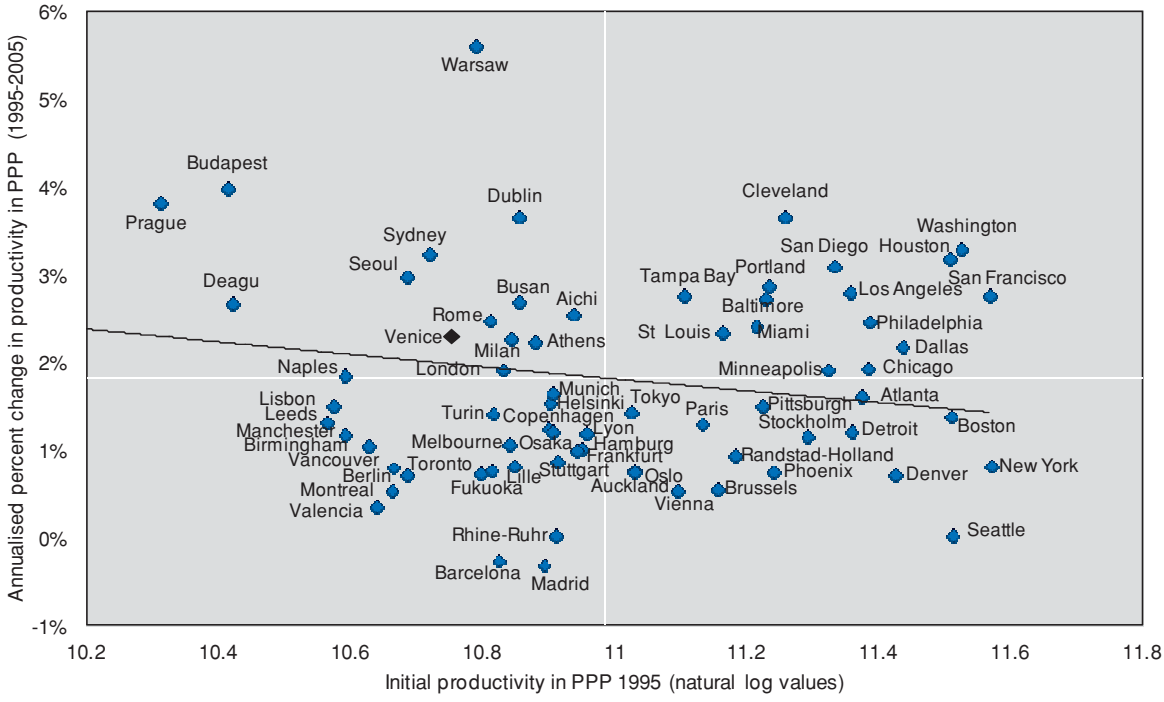
Notes: Data for Australian metro-regions refer to the 1996-2004 period, for Mexican metro-regions 1995-2004, for New Zealand (Auckland) 2000-2003. Ankara and Izmir's growth rates were calculated using the 1995-2001 period, and Istanbul's from 1996-2001. Zurich was not included due to lack of data for several data points.

Source: OECD Urban Development Unit, based on OECD Metropolitan Database, internal database.

Significant advances in productivity characterise the economic growth of the Venice city-region. Its labour productivity approaches the average for OECD metro-regions and is comparable to those in Frankfurt, London, Munich, Sydney or Tokyo (Figure 1.8). Its productivity has been growing faster than the average of OECD metro-regions, double that of Stockholm and around three times faster than Toronto (Figure 1.7). The Venice city-region is among the group of metro-regions with the highest productivity growth rates. Among such groups are the Eastern European metro-regions Budapest, Prague, Krakow and Warsaw, as well as high-performance cities such as Dublin or Sydney (Figure 1.7). However, above-average productivity growth rates are also common among Italian metro-regions, which suggest national economic factors that have helped metro-regions improve their performance. Italy has made great progress in improving the flexibility of labour markets through the elimination of wage restrictions on part-time work, but participation rates remain a key challenge (Figure 1.9).

Productivity increases were likely connected with the process of industrial re-organisation that occurred during the period 1995-2005. By "delocalising" part of the labour-intensive stages of manufacturing processes, tradable industries reached a higher level of productivity (Chiarvesio *et al*., 2006; Coro *et al*., 2006). Similarly, non-tradable industries have contributed to overall productivity growth by shifting employment towards knowledge-intensive business services.

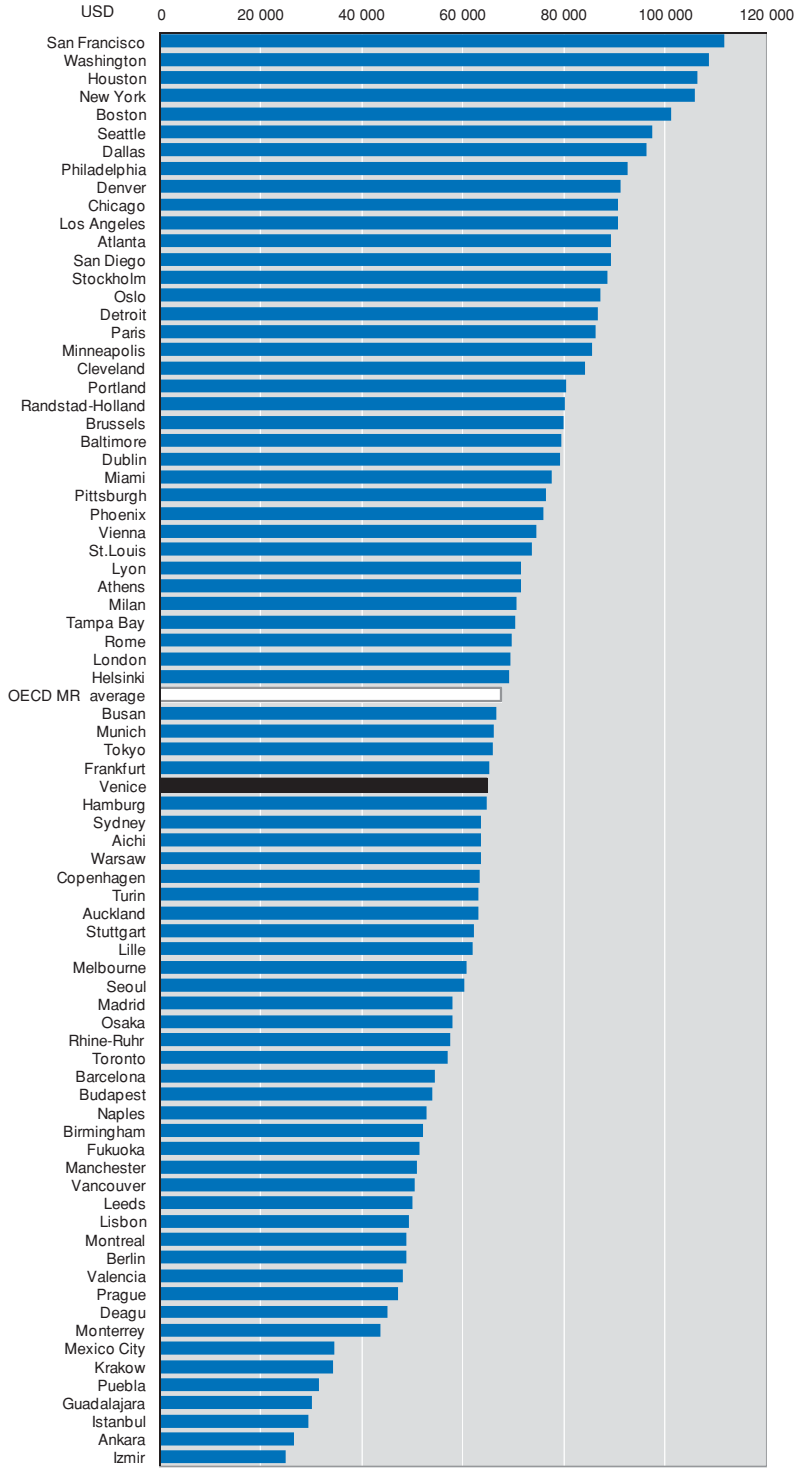
Figure 1.7. **Labour productivity growth among OECD metro-regions, 1995-2005**



Notes: Data for Australian metro-regions refer to the 1996-2004 period, for German metro-regions 1995-2004, for New Zealand (Auckland) 2000-2003. Data for Copenhagen and Busan are for the 1997-2005 period, for Stockholm and Randstad-Holland the 1999-2005 period, 2001-2004 for U.S., and 2000-2005 for Japanese cities. Daegu and Seoul show data for 1996-2005. Data for Turkish and Mexican metro-regions as well as for Zurich were not available.

Source: OECD Urban Development Unit, based on the OECD Metropolitan Database, internal database.

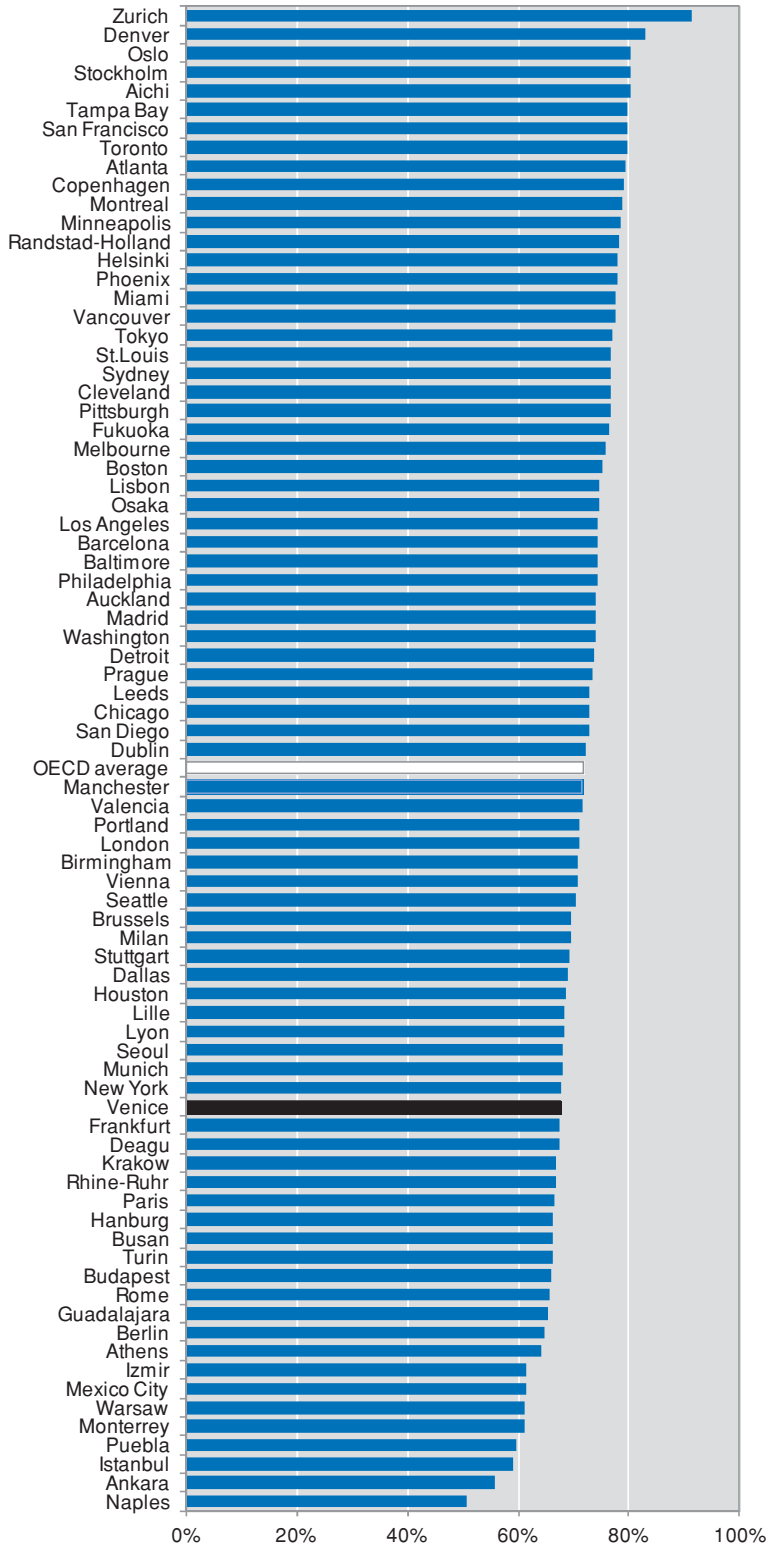
Figure 1.8. **Labour productivity among OECD metro-regions, 2005**



Notes: Data for Australian, U.S. and German metro-regions refer to 2004, whereas Turkish and Mexican data refer to 2000. Data for Auckland refer to 2003, and Zurich data is a calculation for 2002.

Source: OECD Urban Development Unit, based on data from the OECD Metropolitan Database, internal database.

Figure 1.9. **Participation rates in OECD metro-regions, 2005**



Source: OECD Metropolitan Database, internal database.

Labour markets seem to work at least as effectively as the average metro-region in the OECD. Employment rates are close to the average and close to performance in Brussels, Vienna or Seoul (Figure 1.10). In contrast, unemployment rates are among the lowest in OECD metro-regions. Venice's unemployment rate is lower than richer regions such as San Diego, Melbourne, Phoenix, Tokyo or Washington DC (Figure 1.11).[10] Italy in general has been experiencing a surge in job creation, partly due to more moderate wages. Part-time and fixed-contract jobs for low-skilled workers and the hiring of migrants for unoccupied positions helped reduce structural unemployment (OECD, 2007a). However, job creation might be less impressive if part of those jobs already existed in the underground economy. The regularisation of undocumented workers might also yield over-estimated employment creation figures.

The Venice city-region region benefits from a diversified economic base with balanced growth between manufacturing and services (Table 1.2). The services sector grosses the highest value-added, followed by industrial production. However, industrial production is still of considerable importance. Agriculture controls a minor share of the economy, experienced a decline in value added from 2000 to 2005, and mainly focuses on niche production.[11] Throughout Venice, each area specialises in particular sectors: the majority of financial services are located in the province of Padua, tourist and administrative services are mainly located in the province of Venice, while, as already mentioned in this Review, Treviso is the cradle of services dedicated to industry. Decline in value added from agriculture is balanced by a roughly equal increase in industry and services. On the one hand, there has been growth in many sectors such as construction, hotels and restaurants, and real estate.

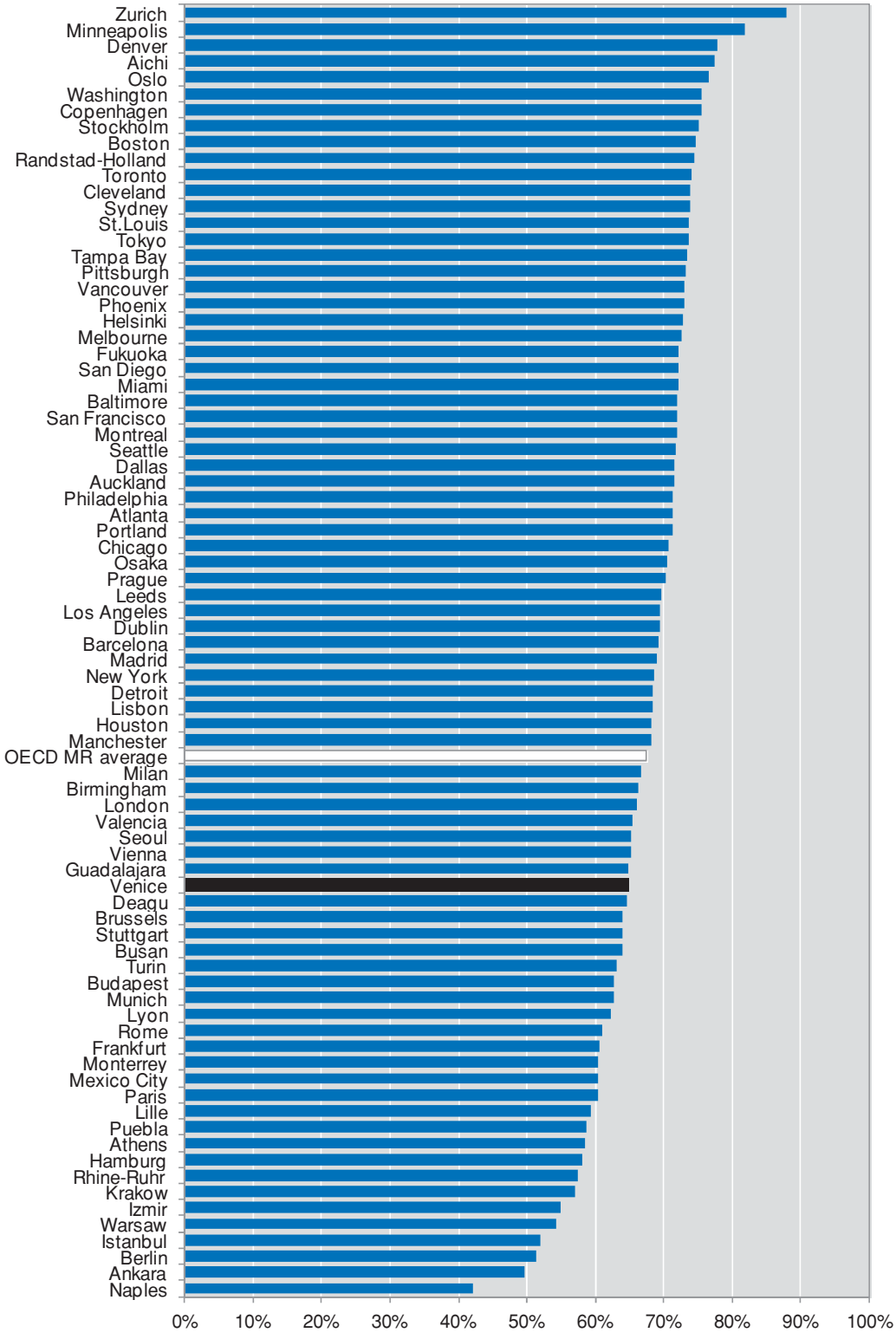
Table 1.2. **Employment in Veneto by economic sector, 1995-2007**

Sector	1995	2007	% change 1995-2007 (%)
Agriculture and fishing	94 800	71 700	-24.4
Industry	787 400	882 400	12.1
Manufacturing	659 000	688 300	4.4
Construction	128 400	194 100	51.2
Services	1 072 600	1 374 300	28.1
Commerce, hotel and public activities, transport and communication, and producer services	95 400	119 800	20.1
Financial intermediation, real estate, and other business services	167 000	293 500	75.7
Other services*	433 700	514 200	18.6

*Note: Other services includes: public administration and defence, compulsory social security, education, activities of households, health and social work, and other community, social and personal service activities.

Source: ISTAT (2009), "Conti economici regionali. Anni 1995-2008", *www.istat.it/dati/dataset/20091111_00/.*

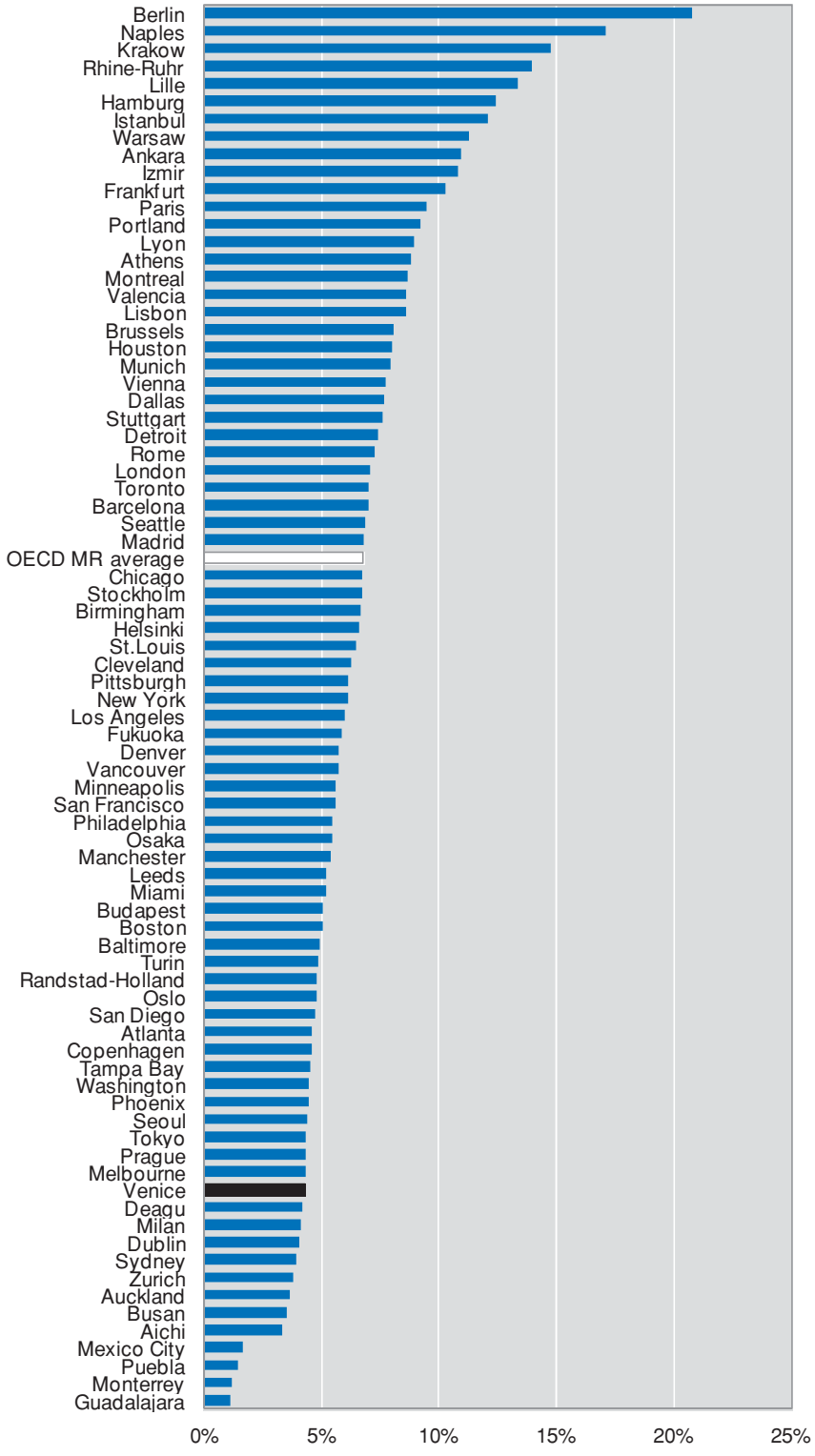
Figure 1.10. **Employment rates in OECD metro-regions, 2005**



Note: Mexican and Turkish metro-regions show data for 2000. U.S. cities use data for 2004.

Source: OECD Urban Development Programme, based on data from the OECD Metropolitan Database, internal database.

Figure 1.11. **Unemployment rates in OECD metro-regions, 2005**



Note: Data for Mexican and Turkish metro-regions refer to 2000, whereas for the United States, MRs refer to 2004.

Source: OECD Urban Development Programme, based on data from the OECD Metropolitan Database, internal database.

Clusters of small and medium-sized, family-owned firms in so-called "industrial districts" have fuelled economic growth. With the exception of firms in the machine-tool industry, most small and medium-sized enterprises (SMEs) produce high-quality consumer goods, including clothing, furniture, kitchen equipment and white goods. Despite being traditionally export-oriented, most SMEs also focus on the Italian domestic market. There are a total of eight metaclusters[12] and 13 clusters in the Venice city-region, which range from biomedical equipment to shoe production (Table 1.3).[13]

Table 1.3. **Clusters and metaclusters monitored by the Veneto Region: Venice city-region, 2009**

Padua	Treviso	Venice
• Biomedical cluster • Euganean thermal cluster • Industrial cooling and refrigeration cluster • Veneto district for lighting systems • Zootechnological metacluster	• Conegliano Valdobbiadene prosecco cluster • Montebelluna sport system cluster • Bicycle production cluster • Hotel equipment cluster • Dairy cluster • Fashion system cluster • Digital media metacluster • Wood furniture metacluster • Sustainable housing metacluster • Rubber and plastic materials district	• Murano art glass cluster • Venetian shipyards cluster • Aerospace and astrophysics cluster • Shoe production metacluster • Venetian Metacluster of Environment for Sustainable Development • Cultural heritage metacluster • Veneto tourism metacluster

Source: Regione del Veneto (2009), "Elenco distretti e metadistretti", *www.distrettidelveneto.it/index.php?option=com_venetianclusters&Itemid=365*.

A changing economic structure with a human capital paradox

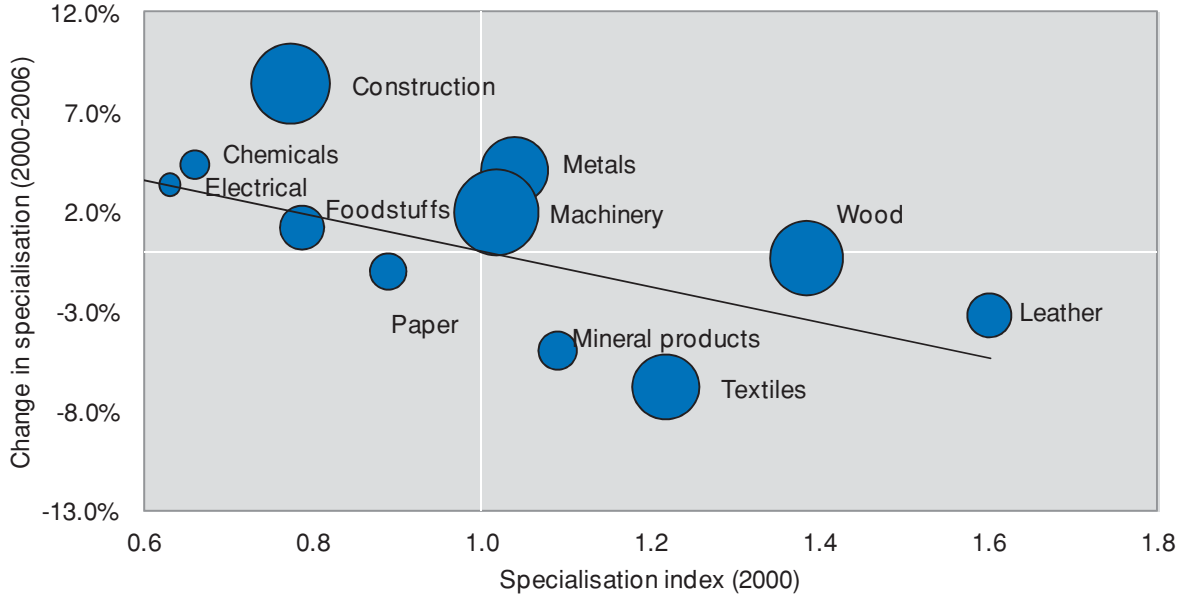
An initial analysis of sectoral specialisation over the period 2000-2006 in the Veneto shows intriguing results. On the one hand, capital-intensive activities in many cases relatively new to the region seem to be growing in terms of specialisation, albeit at lower levels than the national average. On the other hand, the most traditional sectors in the region seem to be losing ground in terms of employment specialisation. The following analysis in this section refers to the level of Veneto, given the absence of data at the provincial or municipal level for the Venice city-region.

In manufacturing between 2000 and 2006, Veneto seems to have experienced a profound industrial change, in which specialised industries lost employment shares relative to the Italian average. Old industrial districts based on textiles, wood and leather products experienced an apparent loss of specialisation. In just half a decade, textiles have lost 8% in terms of specialisation. Large employers in the region, such as machinery and metals, have managed to sustain a slight specialisation (Figure 1.12). But by far the greatest shift is towards construction and to a lesser extent relatively more capital-intensive industries, such as chemicals and electrical. The picture that emerges is one in which Veneto is losing a great deal of specialisation and arguably competitiveness in traditional sectors but where no clear specialisations have yet emerged. Machinery and metals are barely above 1 in the indicator. Although such a change can be the product of delocalisation due to global competition – and this could well be an explanation – there could also be unobservable effects in labour markets. These may include the impact from

the informal economy and the shift of some workers to more knowledge-intensive industries, *e.g.* the transition of *modellisti* or designers in the footwear industry to industrial design.

Figure 1.12. **Sectoral dynamics in manufacturing in Veneto, 2000-2006**

Specialisation Index and changes for manufacturing activities



Notes:

Specialisation is measured as (*Lijt*/*Ljt*)/(*Lit*/*Lt*) where *L* is employment, *i* is industry, *j* is region and *t* is time. Thus, specialisation is the outcome of measuring employment shares in one industry *i* in region *j* compared to national industrial shares as a proportion of total national employment.

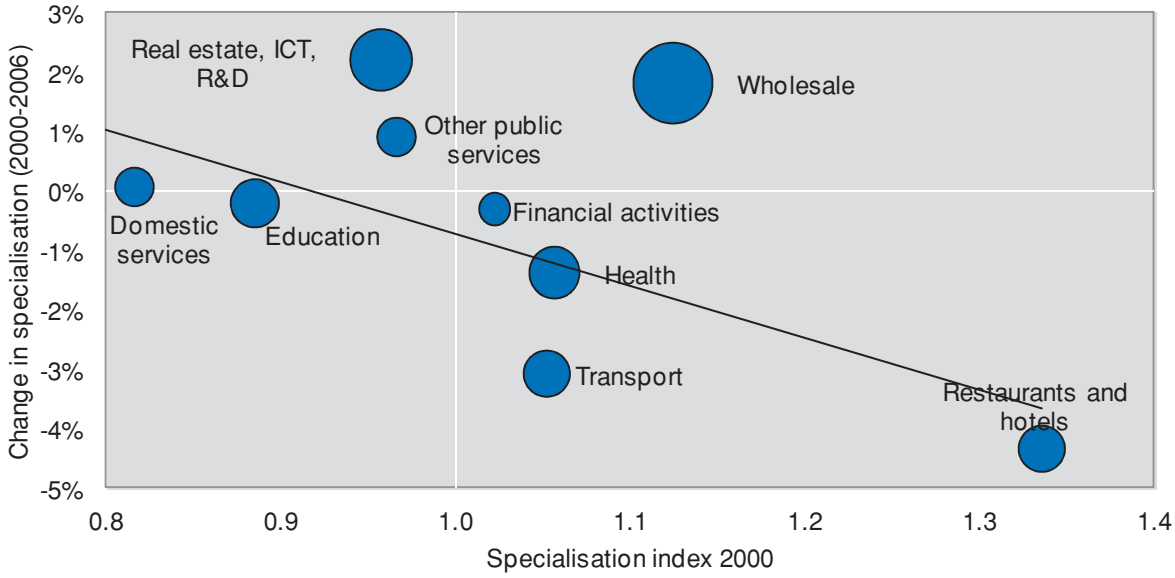
Changes in specialisation refer to the percentage change in the value of specialisation in 2006 compared to that in 2000.

Source: OECD Urban Development Unit calculations, based on ISTAT (2009), "Conti economici regionali. Anni 1995-2008", *www.istat.it/dati/dataset/20091111_00/.*

In services, a similar yet even more striking story seems to emerge. Traditional sectors, particularly for Venice, such as hotels and restaurants, seemed to have lost specialisation rapidly. At the same time, new knowledge-intensive activities such as information and communication technologies (ICTs) and R&D grew rapidly in terms of specialisation (Figure 1.13). The picture that seems to emerge is one of specialisation erosion in key sectors for the tourism industry in Venice, a fast-growing yet not clearly emergent specialisation in R&D and ICTs arguably in Padua, and a single sector with clear and growing specialisation. This suggests not only a sectoral change from traditional (tourism) to new sectors (R&D), but also in the size of firms. From the perspective of industrial organisation, it is possible that economic activity has become less fragmented. In the last couple of decades, Venice's tourism-related firms have shifted from small, family-run businesses (the usual bed and breakfast) to larger units with well-established hotel and restaurant brands exhibiting economies of scale. Although this might still be a possibility, it is also likely that there are unobservable effects in the labour market.

Figure 1.13. **Sectoral dynamics in services in Veneto, 2000-2006**

Specialisation index and changes in services



Notes:

Specialisation is measured as (Lijt/Ljt)/(Lit/Lt) where *L* is employment, *i* is industry, *j* is region and *t* is time. Thus, specialisation is the outcome of measuring employment shares in one industry *i* in region *j* compared to national industrial shares as a proportion of total national employment.

Changes in specialisation refer to the percentage change in the value of specialisation in 2006 compared to that in 2000.

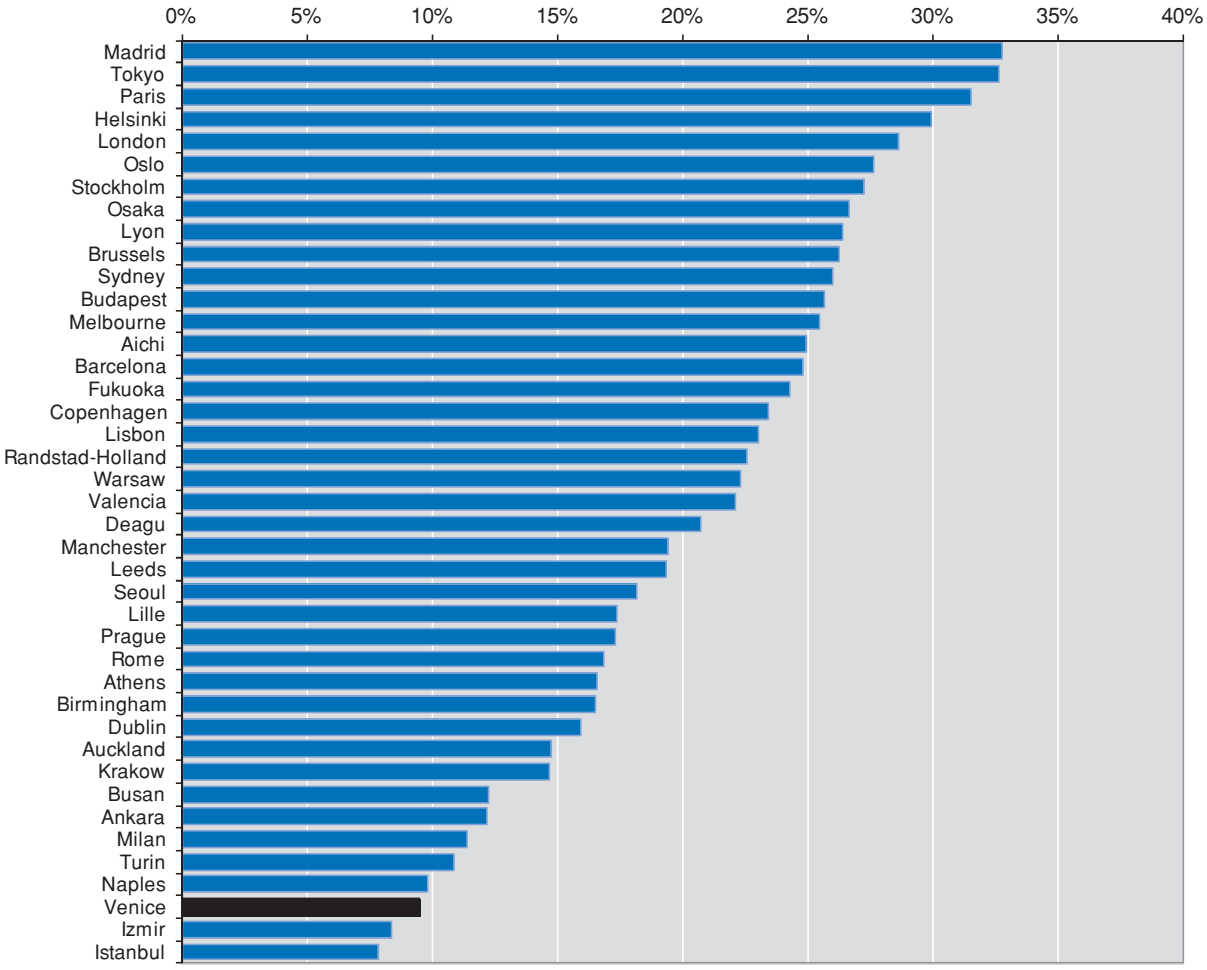
Source: OECD Urban Development Unit calculations, based on ISTAT (2009), "Conti economici regionali. Anni 1995-2008", *www.istat.it/dati/dataset/20091111_00/.*

The Venice city-region, when compared to those OECD metro-regions for which tertiary education data are available, contains a small share of population with tertiary education. In the Venice city-region, less than 10% of the population of 25 years or older has graduated from a university, placing the region as one of the lowest in the OECD rankings (Figure 1.14). Only in the Turkish metro-regions of Istanbul and Izmir are the rates lower. In addition, innovation seems to remain at relatively low levels compared to other metro-regions. Fewer than 100 patents per million of inhabitants were produced in 2005 in the Venice city-region (Figure 1.15). Such patenting activity is not negligible and is comparable to that of cities like London or Milan, but it remains relatively low compared to the majority of OECD metro-regions.

A possible explanation of this paradox is suggested by the analysis of traditional sectors' evolution. In the wine industry, for example, productivity rates rose steadily in the 1995-2005 period, due to improvements in vineyard organisation and irrigation, technology innovations in genetic selection of vines, wine production, bottling processes, downstream changes in wine consumption standards, trade fair facilities, health and quality controls, cultural movements such as Italy's Slow Food movement, wine tours, etc. All these activities contributed to a dramatic transformation of the traditional wine industry, and could be considered more knowledge-intensive than R&D-intensive. Very few of the activities in viticulture require university training and patented research processes. From this point of view, productivity growth and the declining specialisation

of traditional sectors, *e.g.* manufacturing and hotel services, may be compatible with low patent rates and a low share of university-educated labour force.

Figure 1.14. **Tertiary education in a sample of OECD metro-regions, 2005**

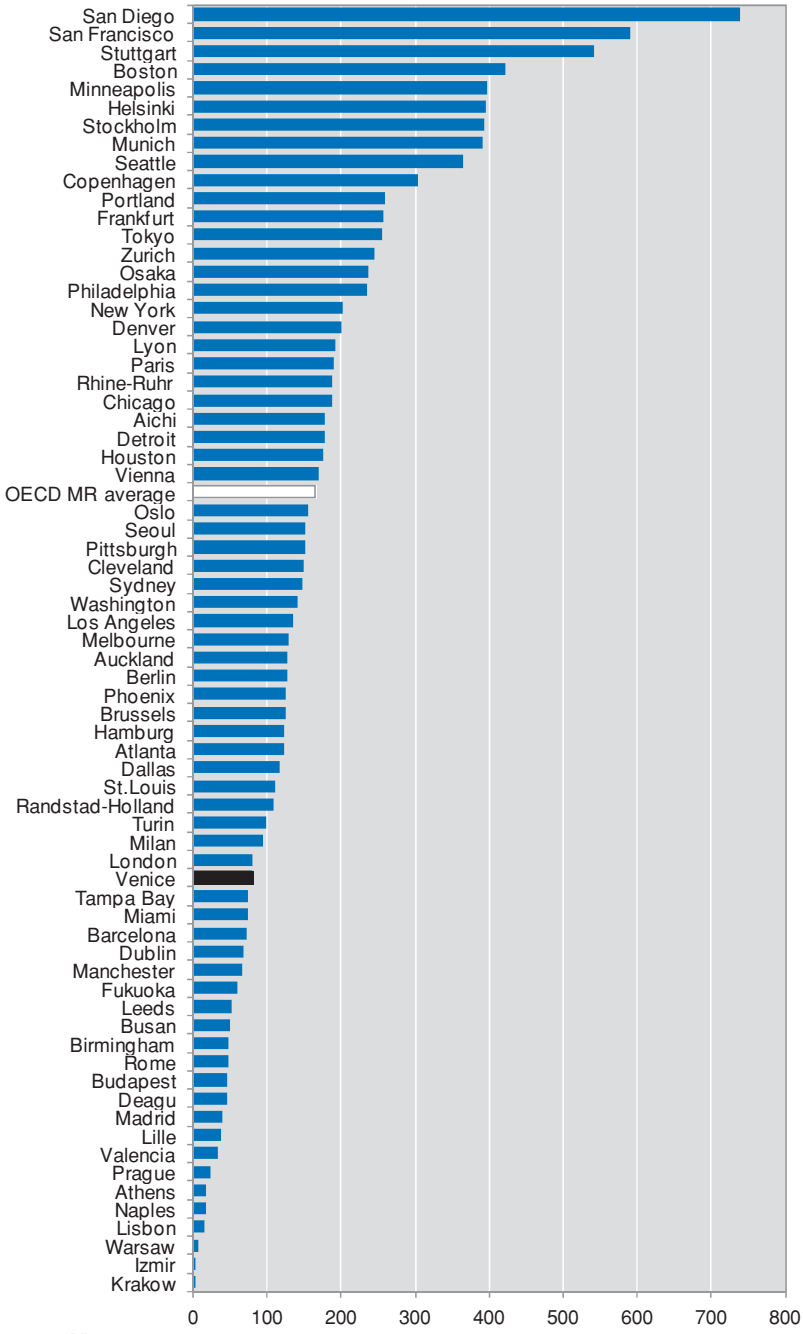


Note: Canadian, Mexican and U.S. cities are not included due to lack of data.

Source: OECD Urban Development Unit calculations, based on OECD Metropolitan Database, internal database.

Figure 1.15. **Patents in OECD metro-regions, 2005**

Patents per million of inhabitants



Notes:

In the case of U.S. metro-regions, patents correspond to the U.S. Bureau of Economic Analysis classification of Economic Areas (EA), rather than to our metro-regional definition. In general, our metro-regions are comprised in the EAs, although the EAs are usually larger.

Baltimore was not included, since it is part of the Washington DC EA, even though it is counted as a separate metro-region in the OECD Metropolitan Database.

Source: OECD Urban Development Unit calculations, based on OECD Metropolitan Database and OECD Regional Database, internal databases.

The parallel economy

The effects of informality

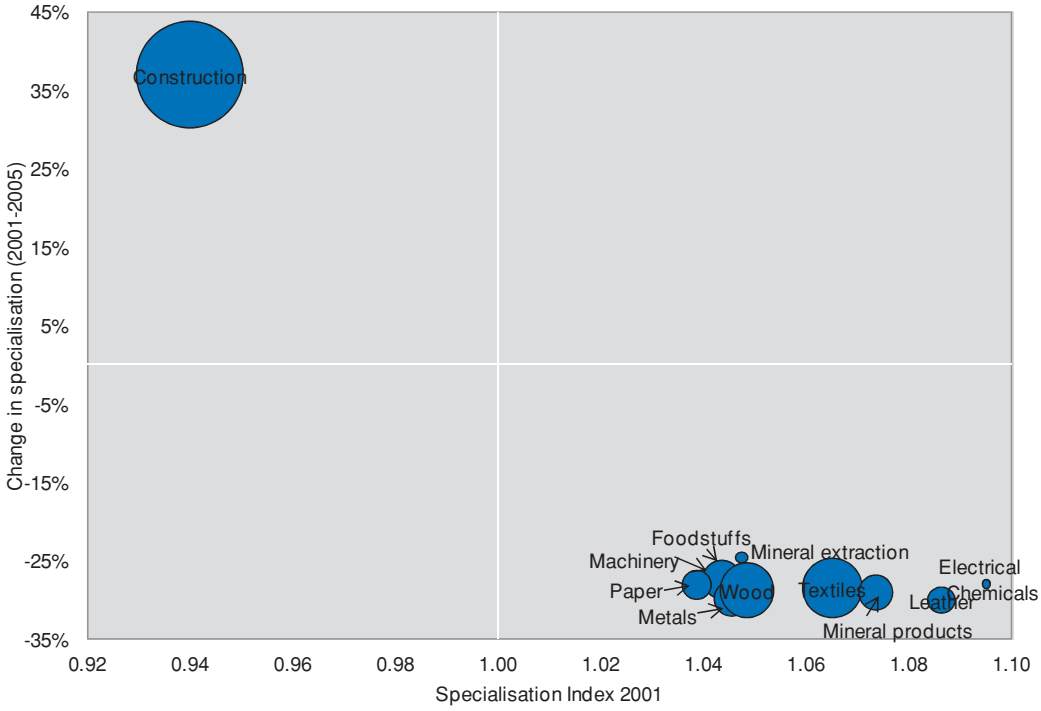
It is likely that informal economic activities mask underlying challenges in terms of productivity and labour markets. Italian statistics already make adjustments of around 15% for GDP and of around 10% of employment to account for informal activities. However, measuring an informal economy at a regional level is always a difficult task. Although it is not possible to determine whether there are challenges in terms of economic performance (economic and productivity growth), an in-depth analysis on employment figures by sector can help shed some light into the biasing effect of the informal sector. In some sectors, between one-fifth and one-fourth of GDP and employment are accounted for by informal economic activities in Italy. Already between 2000 and 2004, the informal economy contributed between 17% and 18% of Italian GDP (ISTAT, 2006). The share is even greater in services where informal activities produce around 22% of the nation's GDP. It is also estimated that 11.5% of employment in Italy is informal, but the figure approaches 20% in services and agriculture. Although informal jobs provide an entry point for undocumented immigrants and release labour-market pressures in northern Italian regions, they present a series of challenges. Not only does the grey economy constrict the tax base and limit government revenue, but it conditions skills acquisition for immigrants and places them in a trajectory of low-paying jobs without pension rights. Though these issues affect Veneto, it is true that within the Italian context Veneto has a lower degree of informality than the national average.[14]

If the informal economy is taken into account, economic changes within the construction sector are more clearly identified. Anecdotal evidence suggests that the construction labour markets in Veneto depend on informal hiring and day-labour. This system entails hiring foreigners through informal networks and the violation of labour legislation and social security. Another form of tax evasion is the rapid opening and closing of a company, often to avoid auditing by tax authorities. The high level of turnover in the construction sector may suggest such practices: in the province of Venice, for example, 850 construction companies opened and 994 closed in 2008 (Camera di Commercio di Venezia, 2009). The director of labour inspections of the province of Venice reported that out of 461 construction work sites visited, 363 were irregular. This resulted in the fining of EUR 400 000 in 2006 (cited in Constantini, 2007). The lower informal wage in the construction sector may fuel the contracting of undocumented workers and unrecorded payments to workers. The effect might be as important as to determine a greater specialisation in construction due to informal (*occupati non regolari*) jobs (Figure 1.16).

In services, sectoral changes are driven by informal employment. The picture that emerged in the previous section was based on a reduction of specialisation on key and traditional sectors such as tourism heavily relying on accommodation and catering. However, taking into account specialisation levels and changes shows that hotels and restaurants, as well as transport, grew in specialisation (Figure 1.17). In only five years, the index of specialisation in restaurants and hotels was 60% higher, and that of transport approached 30%. It is possible that firms in these sectors may be finding some relief in cost and competition pressures by hiring informal workers.

Figure 1.16. **Sectoral specialisation in manufacturing with informal employment**

Specialisation levels and changes between 2001 and 2005 based on informal employment



Notes:

Specialisation is measured as (Lijt/Ljt)/(Lit/Lt) where *L* is employment, *i* is industry, *j* is region and *t* is time. Thus, specialisation is the outcome of measuring employment shares in one industry *i* in region *j* compared to national industrial shares as a proportion of total national employment.

Changes in specialisation refer to the percentage change in the value of specialisation in 2006 compared to that in 2000.

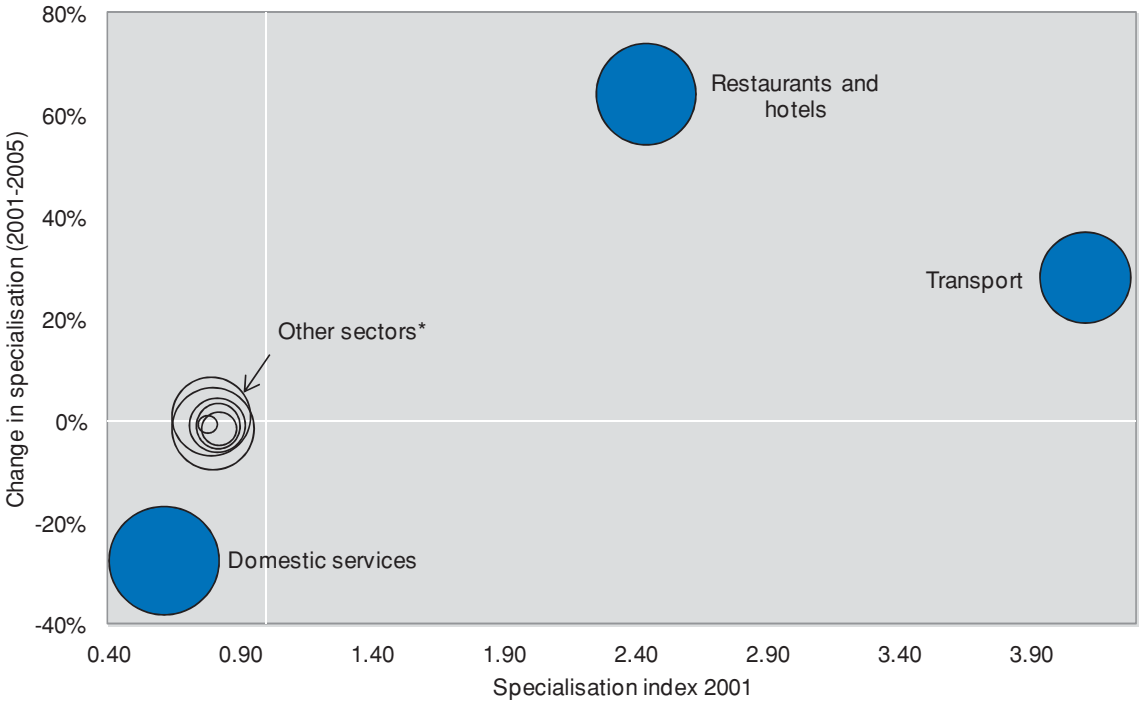
Informal employment includes both full and part-time informal employment (*occupati nonregolari*).

Source: OECD Urban Development Unit calculations based on ISTAT (2009), "Conti economici regionali. Anni 1995-2008", *www.istat.it/dati/dataset/20091111_00/.*

The problem of informal activity in the Venice city-region may have been aggravated by international competition. As firms face increased competition, often based on costs, informality constitutes a relief from these pressures but results in a series of challenges, from the fiscal to the social spheres. Trade has intensified between the Venice city-region and key open economies, such as China and Romania. From 1995 to 2007, imports from China have experienced a sevenfold increase through an average annual growth rate of 16%, while exports from China have seen a threefold increase, at a 9% average annual growth rate (Figure 1.18). Trade with Romania has been more equal: exports and imports to and from Romania have increased three times since 1995 and have implied an average annual growth rate of 9% to 10%. Although FDI data is not available to analyse delocalisation, trade data may suggest that exchange could have been intensified by intra-

Figure 1.17. **Sectoral specialisation in services with informal employment**

Specialisation levels and changes between 2001 and 2005 based on informal employment



Notes:

* Some sectors were excluded for ease of display. These include: real estate, ICT, R&D, health, other public services, education, financial activities and wholesale trading.

Specialisation is measured as (Lijt/Ljt)/(Lit/Lt) where *L* is employment, *i* is industry, *j* is region and *t* is time. Thus, specialisation is the outcome of measuring employment shares in one industry *i* in region *j* compared to national industrial shares as a proportion of total national employment.

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Informal employment includes both full and part-time informal employment (*occupati nonregolari*).

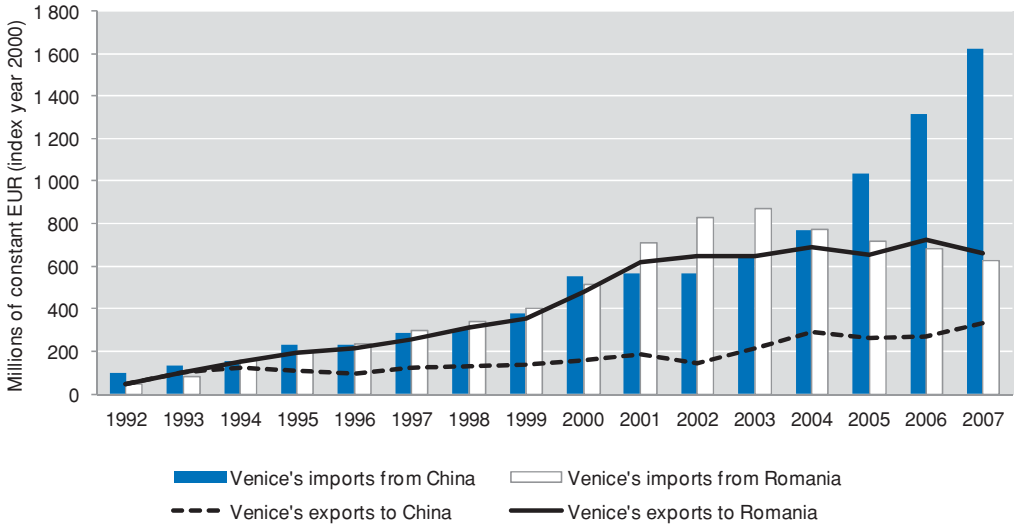
Source: OECD Urban Development Unit calculations, based on ISTAT (2009), "Conti economici regionali. Anni 1995-2008", *www.istat.it/dati/dataset/20091111_00/.*

industry trade, particularly with Romania, where arguably, firms in the Venice city-region have outsourced some of their operations. It is possible that to cope with increased competition, some firms may have resorted to informal labour.

Demographic and labour market changes

In Italy, rising life expectancy, low fertility and an early pension age[15] has increased the dependency of seniors on the working-age population. A broad indicator of the rising economic burden that an older society may place on the working-age population is given by the old-age dependency ratio, *i.e.* the ratio of the population aged 65 and over to the population aged 20 to 64.[16] At around 29% in 2000, Italy currently has the highest old-age dependency ratio among OECD countries, next to Sweden (Figure 1.19). However,

Figure 1.18. **Trade between the Venice city-region and selected countries, 1992-2007**

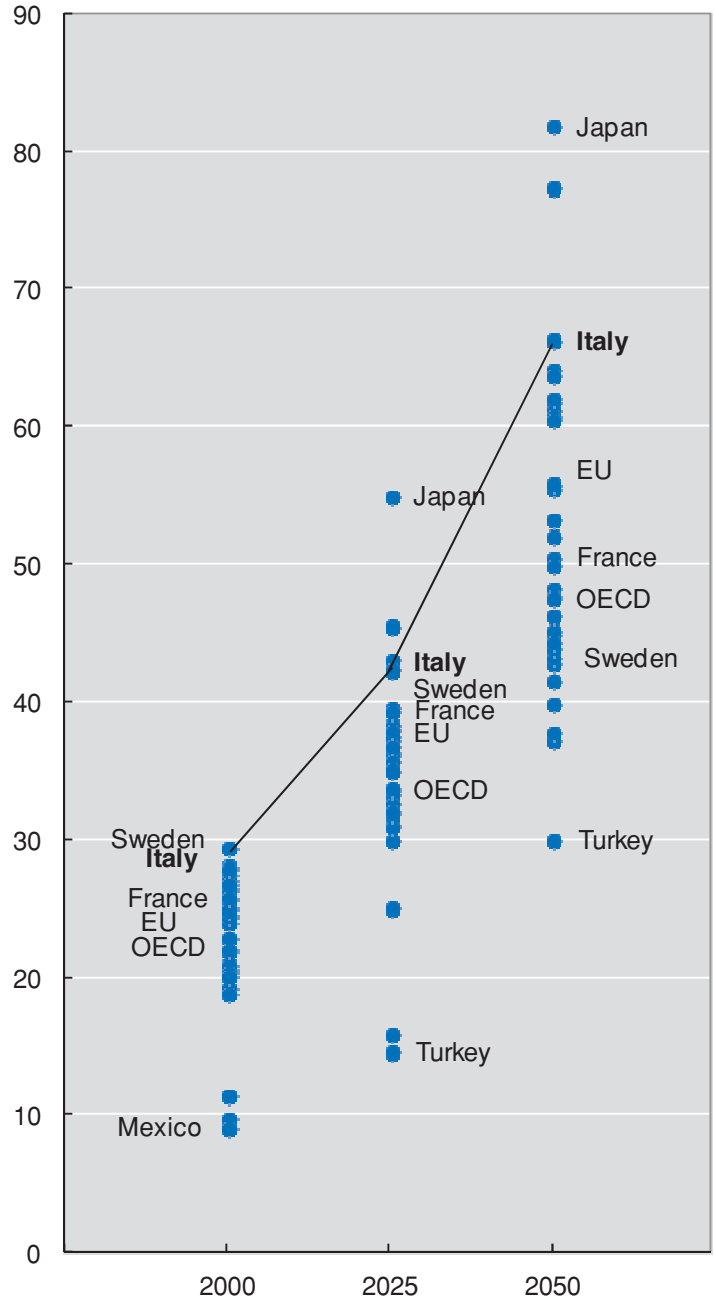


Source: Regione del Veneto (2009), "Foreign Trade: Annual and Quarterly Data by Country and Territory of Trade", *http://statistica.regione.veneto.it/ENG/commercio_estero.jsp*.

Italy's population is projected to age more rapidly than in most other OECD countries. Its old-age dependency ratio is projected to reach 43% in 2025 and 67% in 2050 (OECD, 2004). These changes in the old-age dependency ratio tell only part of the story about the additional burden that may result from population ageing. The economic dependency ratio measures the burden of all forms of non-employment and is defined as the ratio of persons not in the labour force to those in the labour force. If participation rates remain constant in Italy, the economic dependency ratio is projected to rise significantly over the next 50 years, remaining one of the highest among OECD countries. In 2000, there was approximately one person not in the labour force to every person working, a ratio expected to increase 30% by 2050 (OECD, 2004).

One of the economic consequences of such a steep contraction in the Italian labour force is likely to be slower economic growth. Under the constant scenario, real GDP growth could decline by about 0.7 percentage points *per annum* over the next 50 years, relative to the growth rates experienced over the period 1950-2000 (OECD, 2004). The decline under the "average" and "maximum" scenarios would be around 0.5 and 0.1 percentage points respectively. The impact of slower or negative labour force growth on economic growth could conceivably be offset by either a decline in the unemployment rate, a rise in total factor productivity growth or faster growth in capital inputs. Nevertheless, a shrinking labour force could lead to severe labour shortages in certain occupations, especially in those areas, such as nursing and long-term care, where labour demand will expand as a consequence of rapid growth in the elderly population (OECD, 2004).

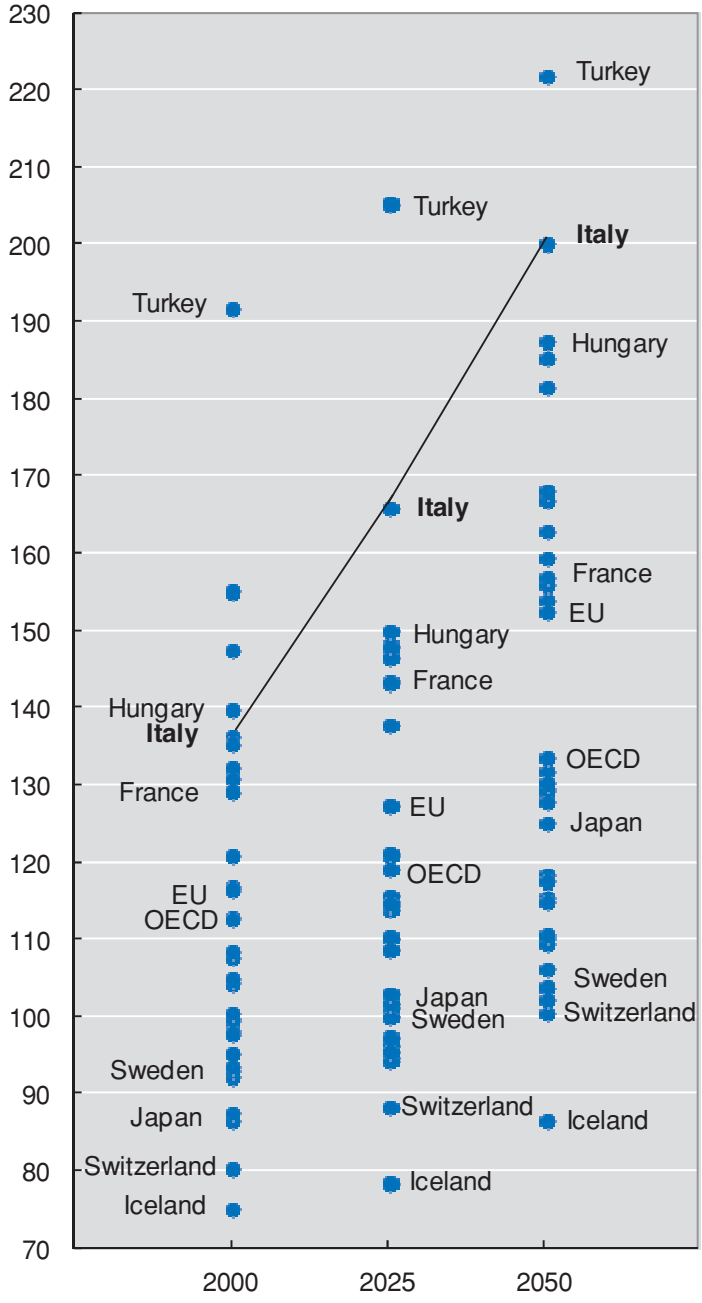
Figure 1.19. **Old age dependency ratio, 1975-2050**



Note: Old age dependency ratio refers to the ratio of the population aged 65 and over to the population aged 20 to 64.

Source: OECD Population and Labour Force Projections Database, internal database.

Figure 1.20. **Economic dependency ratio, 1975-2050**



Note: The economic dependency ratio compares the persons not in the labour force to those in the labour force. The labour force projections assume that participation rates by age and gender remain constant at their 2000 levels.

Source: OECD Population and Labour Force Projections Database, internal database.

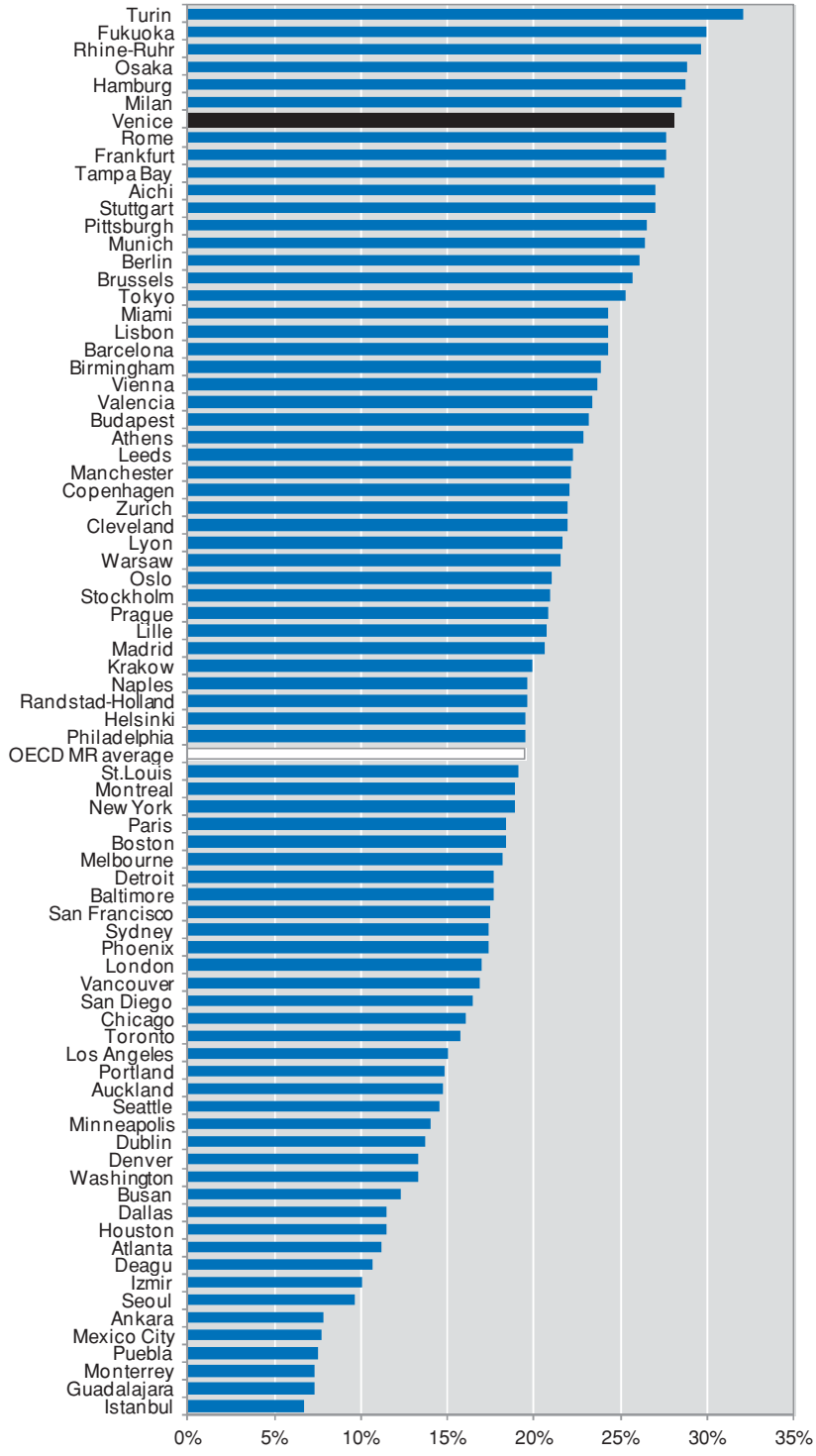
Applying the same assumptions, with participation rates remaining constant at their 2000 levels, labour force growth will be much slower in Italy than on average in the OECD. Over the period 2020-2050, this gap may even widen further, since the rate of decline in Italian labour force could be particularly steep. The OECD predicts that Italy's labour force will shrink at annual rates of -0.4% from 2000 to 2020 and -0.8% from 2020 to 2050, compared with the OECD annual rates of 0.4% and 0%, respectively. Promoting higher rates of labour force participation rates for older people will therefore play a key role in responding to the economic challenges raised by population ageing (OECD, 2004). As a case in point, in 2005, the Venice city-region had one of the highest elderly dependency rates of OECD metro-regions (Figure 1.21).

The Venice city-region is among the most attractive Italian destinations for immigrants. An immigration index that controls for national immigration shares shows that Treviso is in the highest ranking,[17] along with regions in Lombardy and Umbria (Figure 1.24). Documented immigrants from Romania, Morocco and Albania, make up 10.7%, 7.6% and 6.3% of the populations of the provinces of Treviso, Padua and Venice, respectively. The number of documented immigrants has risen at an extremely rapid pace in Veneto. In 1991, 25 471 immigrants lived in Veneto, but this figure grew over fifteenfold, to 403 985 in 2007 (Osservatorio Immigrazione Regione Veneto, 2007). Currently, the Venice city-region's rate of documented foreign-born population stands at 8.13% and is predicted to rise to 18.2% by 2027 (Osservatorio Immigrazione Regione Veneto, 2009). Nevertheless, compared to other metro-regions, such as Toronto or Miami, Venice has a lower rate of documented foreign-born residents (Figure 1.22).

Despite their higher rate of tertiary education, foreign-born residents in Veneto have not been found to be a source of formal innovation. This may be due to the typically small sizes of immigrant firms and their local business networks, which tend to apply for patents less than larger businesses. Such a reality contrasts with the "ethnic inventor" communities discussed in the United States (Saxenian, 2004; Kerr and Lincoln, 2008). Using the World Intellectual Property Organization database for patents filed in Italy from 1998 to 2007 by immigrant non-citizens, De Marchi and Di Maria (2008) found that only 0.58% of the total number of patents filed in Italy were filed by immigrants. The authors contend that this may be caused by the relatively low international appeal of Italian universities such as those in Veneto, which struggle to attract talented researchers from abroad.

Immigrants are a source of relief for labour markets challenged by ageing and a fertility rate below the rate at which a population can be sustained. Although the population growth rate in the Venice city-region (1.14%) is above that of Italy (0.79%), it is insufficient to sustain a growing ageing population (Figure 1.25). The greatest strain is placed on social security and on the size of the pooled labour market. These have been partially relieved by immigrants, whose arrival has been described as a "youth movement," given that approximately 50% of resident foreigners in the municipality of Venice are between 25 and 45 years old, while only 26% of Venetians fall within this age range. Seen another way, while 25.7% of the total population of the municipality of Venice are 65 or older, only 1.8% of foreign inhabitants fall in this range (Municipality of Venice, 2009; cited in Scheppe and IUAV, 2009).

Figure 1.21. **Elderly dependency rate, 2005**



Notes:

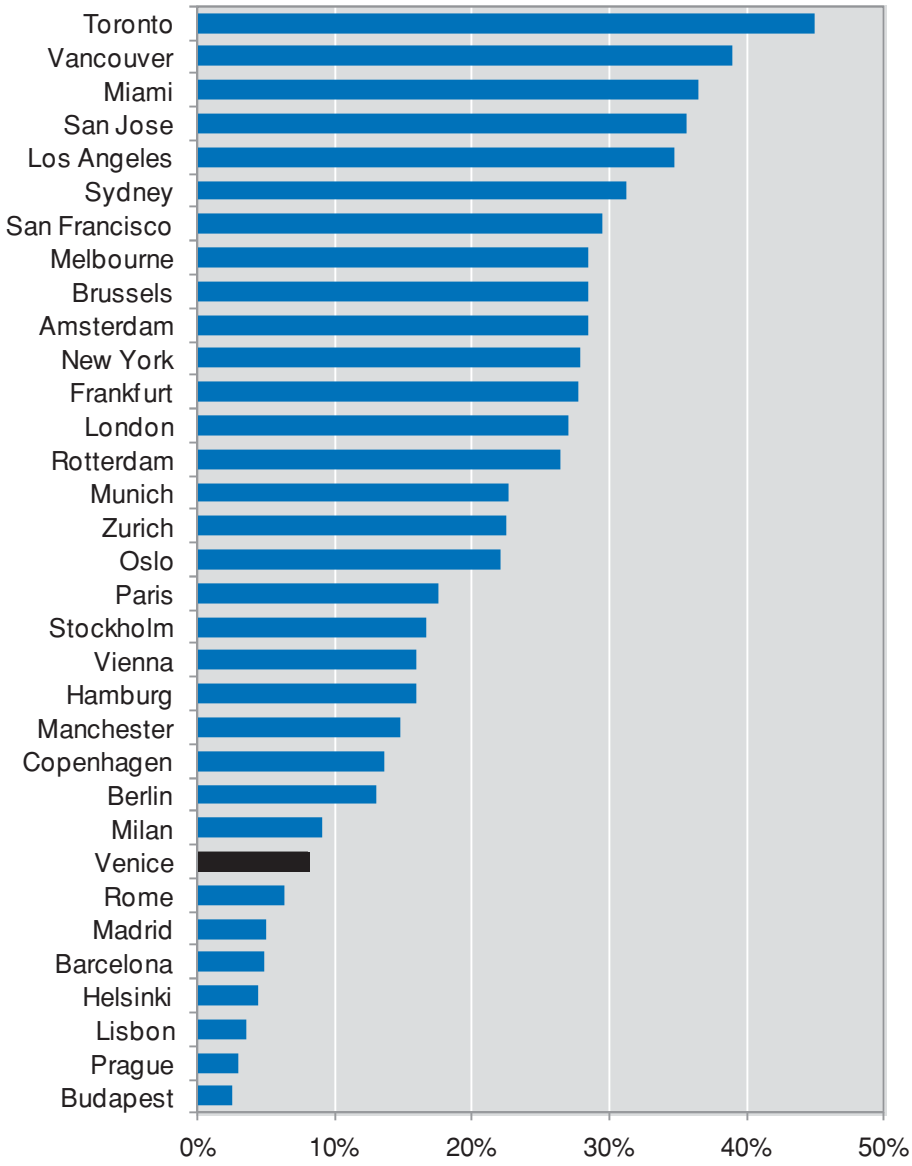
The elderly dependency rate is calculated as the population 65 and over as a proportion of working-age population (15-64).

Data for U.S. metro-regions refers to 2004.

Source: OECD Urban Development Unit calculations based on OECD Metropolitan Database, internal database.

Figure 1.22. **Share of documented foreign-born population in OECD metro-regions**

Various years

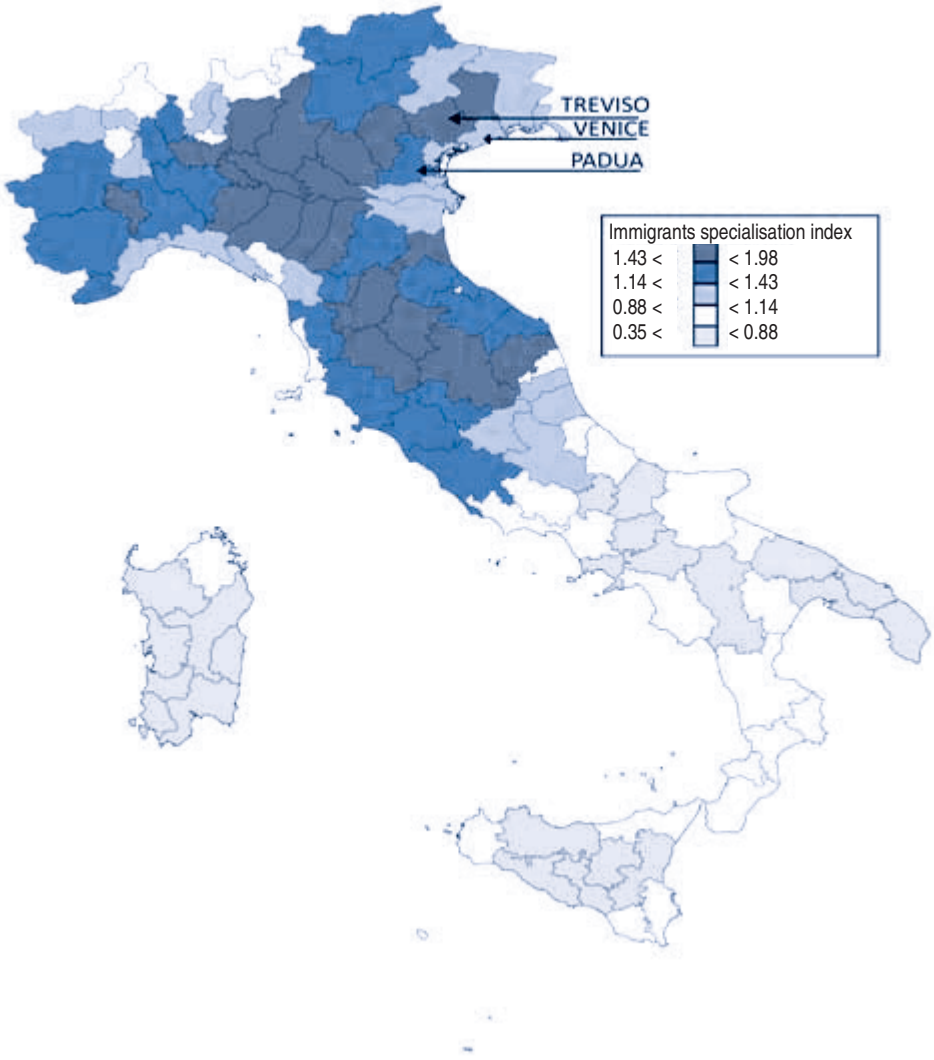


Note: Data refer to Metropolitan Statistical Areas for U.S. cities, Census Metropolitan Areas for Canadian cities and to municipal boundaries for the other cities. Data are from 1998 (Brussels), 1999 (Paris), 2000 (Helsinki, Rome, Milan, Zurich), 2001 (Budapest, Prague, Manchester, Vienna, Stockholm, London, Frankfurt, Melbourne, Sydney), 2002 (Lisbon, Barcelona, Madrid, Hamburg), 2003 (Berlin, Munich), 2004 (Oslo), 2005 (Rotterdam, New York, Amsterdam, Los Angeles, San Jose, Miami) and 2006 (Copenhagen, Montreal, Vancouver, Toronto). The share of foreign-born population given for Toronto refers to the rate of immigrant population in the Toronto CMA. The Venice figures are from 2007 and refer to the city-region.

Source: OECD (2010), *OECD Territorial Reviews: Toronto, Canada*, OECD Publishing, Paris.

Figure 1.23. **Regional immigration destinations**

Measured by an Index of Immigration



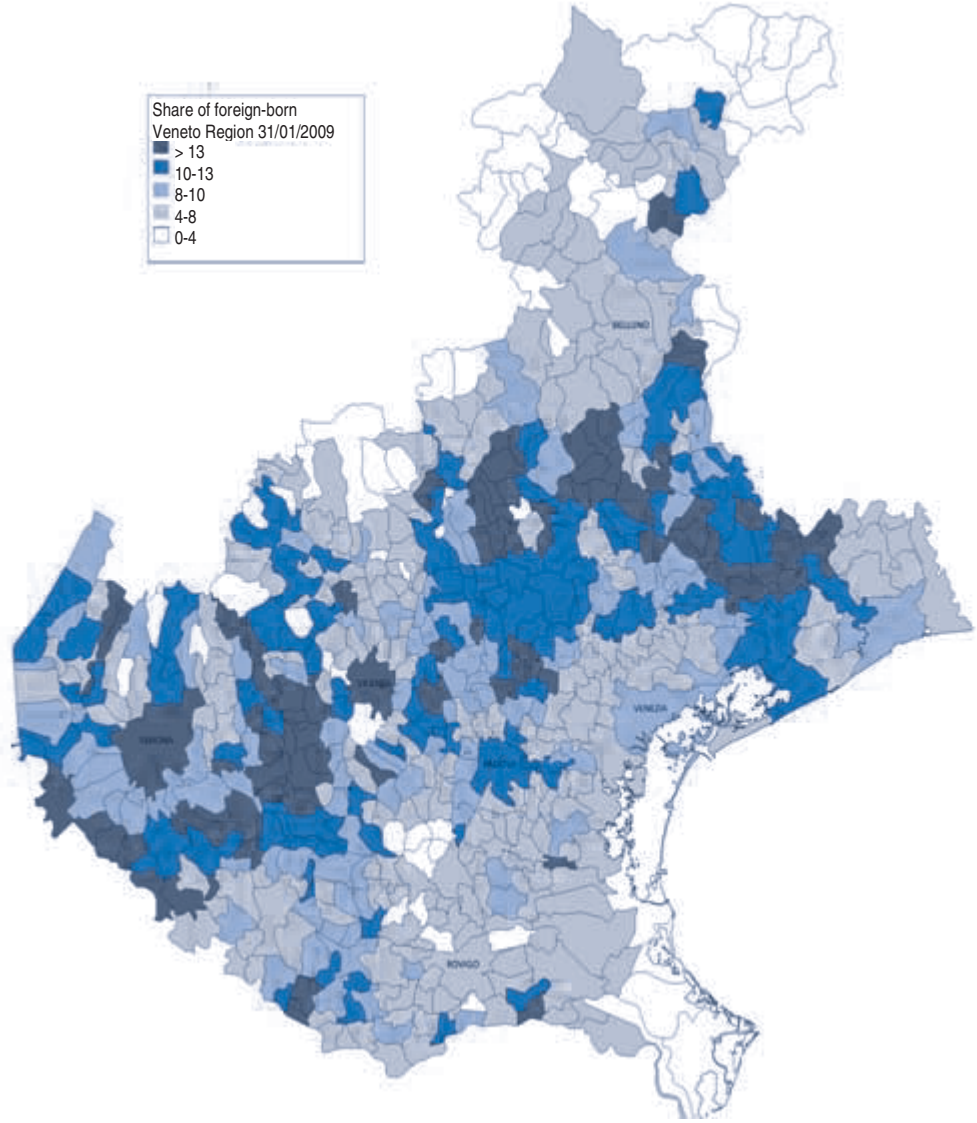
Note: Immigration Index = (Ij/I)/(Pj/P) where *Ij* = resident immigrants in province *j*, *I* = resident immigrants in Italy, *Pj*=resident population in province *j*, and *P*=resident population in Italy).

Source: OECD Urban Development Unit calculations, based on ISTAT (2009), "Conti economici regionali. Anni 1995-2008", *www.istat.it/dati/dataset/20091111_00/.*

Labour forces within in the Venice city-region have grown at very different rates, Venice growing at just 0.6% annually since 1999, Treviso at 2.4%, and Padua at 1.6%. The fact that Treviso and Padua's labour force have been growing four and three times as fast as Venice's suggests two non-mutually exclusive hypotheses. First, it is possible that economic dynamism in Padua and Treviso has attracted new migrants (although these are also driven by social networks). Second, informal employment based on illegal immigrants might be more common in Venice, and official population and labour statistics may not account for such dynamics. In 2009, for example, it was estimated that

Figure 1.24. **Location of migrants in Veneto, 2004**

Share of foreign-born to total population

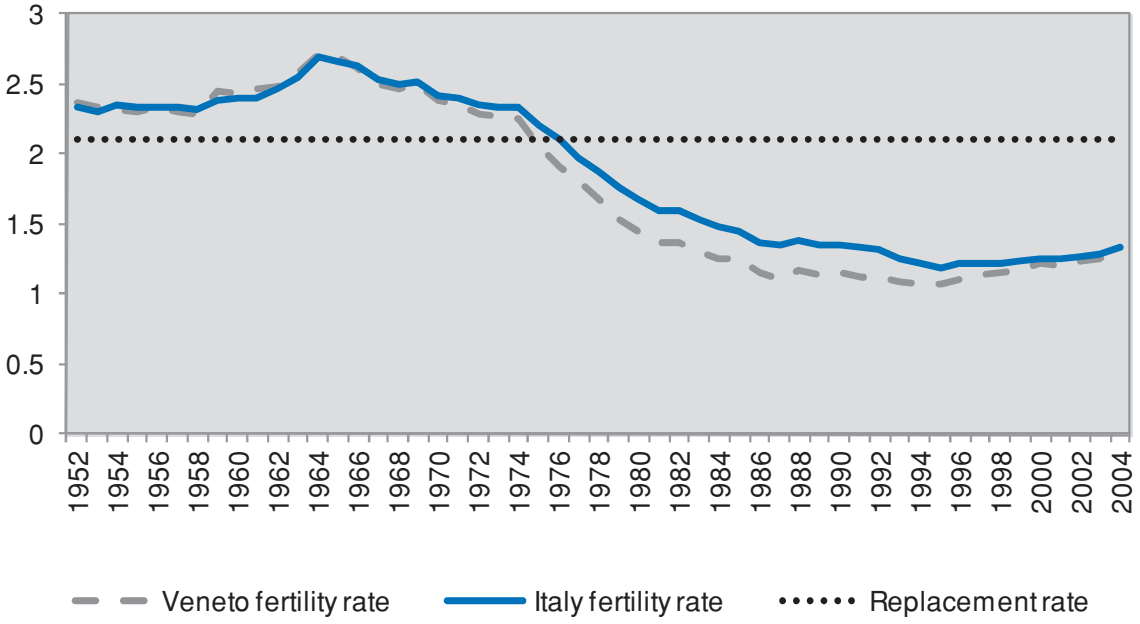


Source: OECD Urban Development Unit calculations, based on data from ISTAT (2009), "Conti economici regionali. Anni 1995-2008", *www.istat.it/dati/dataset/20091111_00/.*

between 10 000 and 15 000 undocumented immigrants worked in the municipality of Venice alone (Scheppe and IUAV, 2009).[18] At the city-region level in 2007, approximately 42 000 undocumented immigrants worked in the area, according to the organisation *Iniziative e Studi sulla Multietnicà* (ISMU) and ISTAT.

The low levels of female participation constitute an additional demographic and labour market challenge. Female participation rates in the Venice city-region are among the lowest in OECD metro-regions (Figure 1.26). Only Busan, Seoul and Naples show lower levels, indicating weaknesses in the labour market as a key resource is lost. On the whole, trends are positive, and the female employment rate is steadily increasing.[19] As

Figure 1.25. **Fertility rates in Veneto and Italy, 1952-2004**



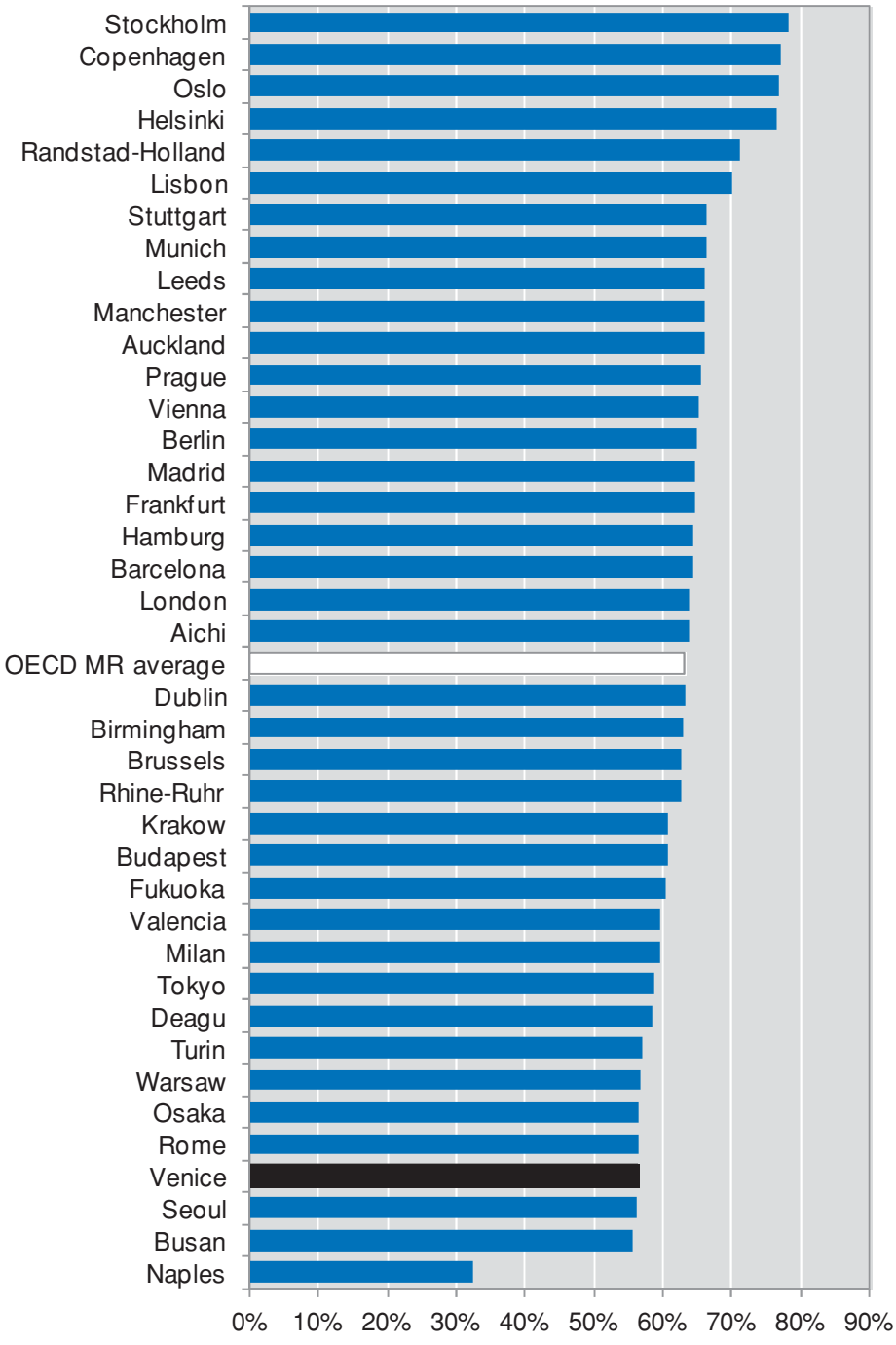
Source: ISTAT (2009), "Demography in Figures", *http://demo.istat.it/index_e.html*.

population and labour force pressures increase over the years to sustain elderly population and social transfers, a greater participation of women could make a difference in enlarging the labour force. Additional gains could be made in the field of engineering, for example, where women are under-represented in Veneto. In 2007, male engineering students who graduated from a university in Veneto outnumbered female graduates by six to one (Regione del Veneto, 2008a).

1.3. Is the model resilient to the transformational changes taking place?

The Venice city-region has undergone a period of rapid evolution, subject to several economic shocks. The economy emerged in the late 1970s with a system renowned for its connection to small and medium-sized businesses, and quickly became the economic centre of gravity of Italy. After many successful years of economic growth and presence in international markets, this model faced a number of severe shocks in the 1990s-2000s. The first was the introduction of Europe's single currency in 1999. Having grown used to taking advantage of competitive currency depreciation to increase their market shares worldwide, Veneto's companies may have underestimated the impact of the euro. The new common currency imposed a new competitive conduct based on innovation and the search for original strategies. A second shock came from Asian competition, which, particularly in the textile, clothing and footwear industries, caught many Italian companies off guard, especially those still manufacturing low- and medium-quality products. Although the strategies of the Asian competitors were largely predictable, many textile companies were hurt by the arrival of new competitors. This effect was compounded by a third shock: the decline of the U.S. market from 2001 onwards, which was one of the leading export destinations for "Made in Veneto" quality products.

Figure 1.26. **Female participation rate, 2005**



Note: Data for Japanese cities refers to 2000.

Source: OECD Urban Development Unit calculations, based on OECD Metropolitan Database, internal database.

The confluence of these shocks has created a new economic scenario. A more sustainable model would need to address three broad and related issues:

- First, a profound re-organisation is currently taking place in the Veneto regional economy. The region has endured a change in sectoral specialisation towards services and highly knowledge-intensive products. This re-organisation of the economic fabric in the tradable sector, specialised in low differentiated products, has tended to rely on delocalisation and the informal economy. Attention needs to be placed on building "scaffolding" structures – trade fairs, professional organisations, certification bodies and communication media – among SMEs in niche value chains. Fostering innovation and upskilling the labour force, which was traditionally dependent on industrial manufacturing, has become a complex task.
- Second, attention needs to be paid to the spatial dimension of the economy to improve the mobility of the regional labour force and facilitate metropolitan-wide inter-firm linkages. Physical infrastructure will be key in helping the Venice city-region become a truly polycentric metropolitan region, given its sprawling urban form and "centreless" structure.
- Third, the Venice city-region faces serious environmental concerns stemming from its unique combination of hydrological vulnerability, urban sprawl and heavy industry. These are not issues that the Venice city-region can deal with over the short term. A "climate lens" needs to be applied to questions of economic competitiveness, given climate change projections that illustrate rising sea level and temperatures in the Venice city-region and the reality that 75% of the province of Venice is already under sea level.

A deep re-organisation of the economic system

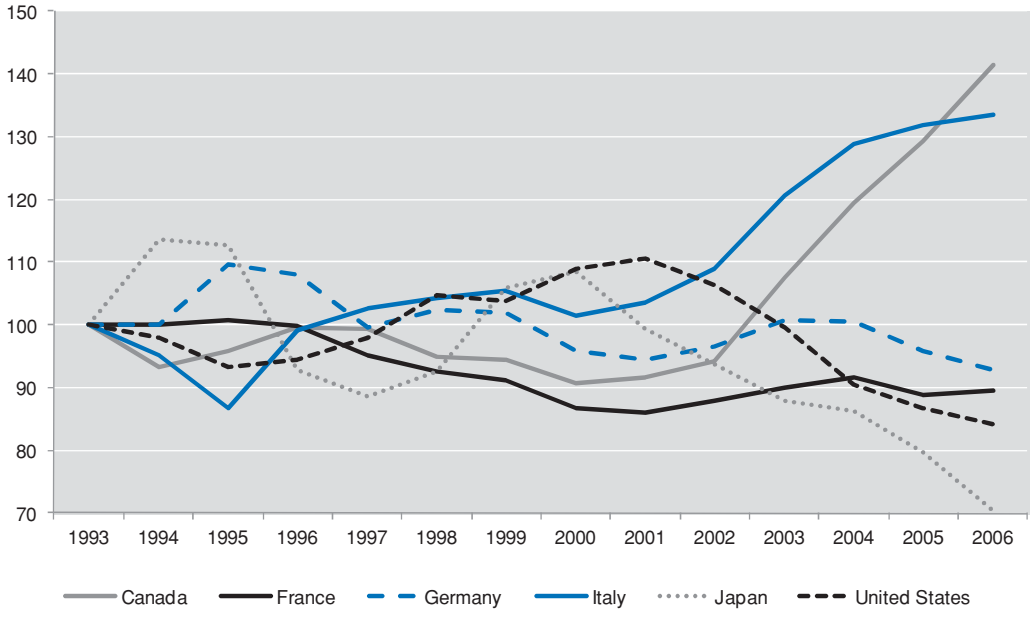
The Venice city-region seems to be undergoing a process of re-organisation that may have spatial implications. On the one hand, tradables such as most manufacturing production typically based in Treviso have faced increased competition with the emergence of China and other East Asian countries, at a time when the introduction of the euro still had some impact in terms of competitiveness. On the other hand, Venice and Padua have been specialising in non-tradables, namely tourism and life sciences. Such re-orientation from tradables to non-tradables could condition future economic development. Although non-tradables are crucial for attractiveness, productivity growth in the tradables sector enables wages and employment in the economy to grow. Synergistic economies between these sectors may provide one source of growth. This can be seen in how tourism has simultaneously triggered a growth in manufacturing, especially glass, and the development of tourist services.

Outsourcing and offshoring have been used in the tradables sector in order to cope with competition. During the last decade, the production system has endured profound changes, thanks to the internationalisation of the productive chain and the rising costs of labour in Italy (Figure 1.27). This entailed moving abroad part of the simpler manufacturing stages, first to Eastern Europe and then to Asia. Slow growth in Italy has been accompanied by a steady increase in labour costs relative to prices (since 2000, unit labour costs have risen by 6% more than the GDP deflator), implying a considerable weakening in overall profitability. This flow of business investment abroad has

undoubtedly also encouraged the investments that Italian banks have made in subsidiaries in those countries (OECD, 2009b).

Figure 1.27. **Relative unit labour costs in manufacturing, 1994-2007**

Year 1994 = 100



Source: OECD System of Unit Labour Cost and Related Indicators (2008), internal database.

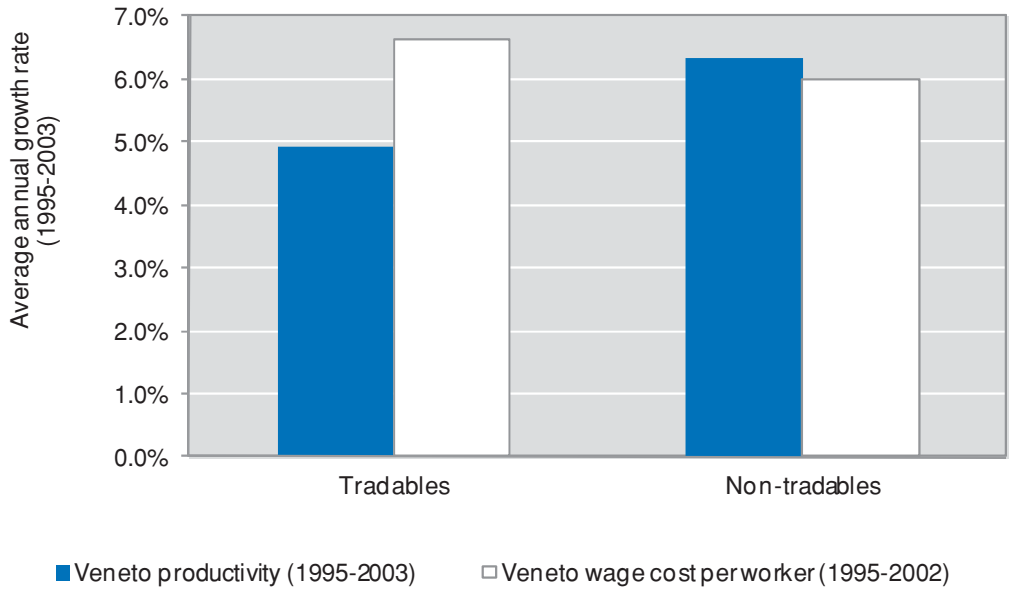
The transfer of industrial production abroad was perceived as a veritable threat to the regional economy not only due to the loss of jobs in SMEs, but also because these firms are typically innovative. The loss of jobs due to the dismantling of consolidated activities was not the only cause for concern. What troubled many was the awareness that the manufacturing activities in small and medium-sized companies had always triggered forms of innovation, of varying degrees of refinement. SME strategies are globally linked now more than ever: nearly one-third of SMEs in Italy now produce their output through an international value chain. This has taken place through the participation in sales networks abroad and the outsourcing of low-skilled activities, such as the mass assembly of garments.[20] Artisanal firms, in contrast, for instance, have not invested much in formal business knowledge and internationalising their networks. For these types of companies, the transfer of production abroad was potentially life-threatening. However, the impact of these restructuring processes is generally positive. For instance, even though trade conditions have worsened after the euro's revaluation, Venetian exports recovered rapidly in 2006 and 2007. Difficulties are more evident in specific sub-sectors – apparel, tanning, goldsmithing, etc. – and not in larger sectors, such as metalworking components or machinery production, which have improved their position in international markets.

Outsourcing and off-shoring have emerged as common practices to improve competitiveness. In developed economies, productivity grows faster in tradables, and such productivity increases are translated into income via higher wages. Non-tradable activities tend to be more expensive in successful places, as prices in such sectors rise to compensate for higher wages in the more productive sector, *i.e.* tradables

(Balassa-Samuelson effect). In contrast, developing economies have typically higher productivity growth rates in non-tradables, and wages in tradables remain lower, although they can increase in the former, as competitiveness relies on labour costs. Because the Venice city-region is increasingly trying to compete less on labour costs and more on differentiation through design, outsourcing and off-shoring seem viable options.

However, a pressing issue remains: productivity differentials between tradables and non-tradables. A Venice city-region increasingly based on non-tradables, *e.g.*, tourism, real estate, education and to a lesser extent R&D, may generate sizeable capital inflows. Productivity growth in non-tradables in the Veneto is higher than tradables by 1.3% (Figure 1.28). At the same time, wage increases in tradables have stood at 6.6% annually in Veneto; compared to productivity growth rates of 4.9% in that sector, wages have been growing faster than productivity. Wage increases from the demand for non-tradables in Veneto may aggravate lagging productivity in services. Higher capital inflows in non-tradables may lead to higher factor prices, such as labour.

Figure 1.28. **Productivity and wages in tradables and non-tradables in Veneto**



Note: Manufacturing was considered a broad proxy for tradables, even if some activities, such as the production of bread, might be less tradable. Similarly, services were considered as non-tradables even if some activities might be more tradable, such as R&D.

Source: ISTAT (2009), "Conti economici regionali. Anni 1995-2008", *www.istat.it/dati/dataset/20091111_00/.*

Human capital formation via tacit and codified knowledge and innovation stand out as policy objectives to improve productivity. Human capital formation via schooling and codified knowledge are important policy objectives, as large firms typically exhibit a larger demand for higher skills and higher innovation intensity as they compete in highly differentiated markets. Small and medium-sized firms in contrast rely more on schemes

such as on-the-job training and other forms of employee skills-upgrading as they compete less on the basis of differentiation and more on the basis of "technical specialisation". Innovation processes, in this context, are fostered by localised business technical services. Since large corporations and vocational schools (led by teachers having field experience and strong links with leading companies) do not transfer localised knowledge, other "interface" organisations could be designed. The era of one-stop-shop services for business development (*centri di servizio reale*) is over. This is critical, given that science parks are generally unable to produce efficient knowledge management services or provide efficient support to innovation processes in SMEs and "mini-multinationals". Three themes in particular merit focus at this point: the isolated university system, under-developed innovation frameworks, and the importance of a new economic paradigm based on complexity and creativity management.

Delays in Veneto's court system alarm foreign investors and may explain why only one half of one per cent of Italy's foreign investment is located in the Venice city-region. Elsewhere in the European Union, commercial disputes are resolved faster – sometimes three times as fast – than in the Veneto. In Padua, for instance, concluding a typical court case takes 41 procedural steps, lasts approximately 1 808 days, and costs 27.3% of the value of the claim. In Padua, it takes on average 30 days to file the case, another 1 406 days to conclude the trial, and another 372 days to enforce the judgment. According to the World Bank's *Doing Business in Veneto* (2009) report, Padua ranks at 156 out of 181 regions in resolving commercial disputes. The issue of the exceptionally long duration of dispute resolution is commonplace in other cities in Italy and has even attracted the attention of the European Court of Human Rights.

An isolated university system

Universities in the Venice city-region educate a large number of students, but are not highly ranked internationally. At an international level, the universities in the region and, in particular, the two Venetian universities, suffer from their small size and the limited number of engineering and technical courses and research centres. The only university to be ranked in the global 500 by the Shanghai Jiao Tong 2008 Universities ranking is the University of Padua. Although it received the fourth-highest ranking in Italy, its global ranking was 189 and it ranked 74th in Europe. The University of Padua scored lower (294) in the Times Higher Education 2008 ranking. As one might expect, universities in the Veneto city-region fare better in Italian rankings, such as the rankings of the Censis-Repubblica and the Sole 24 Ore, which placed the University of Padua first in the category of "mega-universities" matriculating more than 40 000 students.[21]

Few synergistic initiatives have been implemented to link the city-region's university system. Therefore, while the Venice city-region has an endowment of historical universities and has created new ones, the universities are generally disconnected from one another and instead specialise on a particular profile. There is no tradition in the region of entrepreneurs endowing chairs or creating fellowship programmes for students, and not much of private business and university laboratories partnering in the development of products and services. Educational research institutions and business remain two largely separate worlds. Turning the observation around, it is also true that universities have generally not moved to meet the needs of the business community and of the workforce. Courses are generally not taught at night, to allow student workers to earn degrees while continuing to work; and lifelong education for adults – employed or trying to re-enter the job market – is still a goal in search of a policy.

Underdeveloped innovation frameworks

Standard innovation measurements illustrate a problematic state in the city-region, though these methodologies often do not account for the region's informal processes of innovation. The annual statistical report of the Veneto Region assessing innovation performance finds that while the level may be high for Italy, it is low compared to other metro-regions. The 2007 Regional Statistical Report reads:

> *The Veneto Region ranks 122nd among the 203 regions analysed, with a RRSII in 2005 equal to 0.40, not far from the 0.43 average score. The index variation as against 2002 is not significant, as it consists of variations by a few decimal points around the median. The RRSII is a composite of the following five indicators: post-secondary school education population, participation in life-long learning, employment in medium/high-tech manufacturing activities, employment in high-tech service activities, R&D expenditure by public bodies, R&D expenditure by private companies, applications for high-tech patents. The analysis of data shows that the Veneto has below-average education levels and that, notwithstanding a good level of occupation in medium/high technology manufacturing companies, the region still invests too little in research, either publicly or privately (Regione del Veneto, 2007a).*

As shown in Table 1.4, the number of patent applications published by the European Patent Office (EPO) in the last few years varies, and its growth is not constant. It is important to note, however, that innovation performance in many of the Venice city-region's manufacturing sectors, *e.g.* footwear and furniture production, is undercounted by official statistics, as such sectors require R&D expenditure that is considerably different from that of more technologically oriented sectors. Similarly, patents protecting these creations are often less numerous than those protecting, for instance, a personal computer.

Table 1.4. **Number of European patents published by the European Patent Office, by million inhabitants**

	2002	2003	2004	2005	2006
Province of Padua	69.1	95	97.5	103.9	107.6
Province of Treviso	112	154.6	136.5	97.3	122.8
Province of Venice	18.7	40.7	28.8	30.5	23
Venice city-region	**66.2**	**95.7**	**87.8**	**77.4**	**84.9**
Veneto Region	81.4	94.9	101.8	95.3	98.8
North-west Italy	110.1	108.4	126.2	124.5	128.3
North-east Italy	100.4	105.8	110.7	115.7	114.3
Central Italy	40.6	40	52.4	42.1	54.8
South and insular Italy	4.9	6	5.4	6.4	7.4
Italy	57.2	58.2	66.1	65.2	68.8

Source: Processed by Unioncamere and Dintec (2008), *Osservatorio brevetti Unioncamere e Marchi*, *http://assonews.alintec.it/index.php/dal-web/doc_download/23-osservatorio-unioncamere-brevetti-e-marchi* on data supplied by European Patent Office (EPO) (2002-2006).

Data limitations aside, Veneto scores low on research and development expenditure when compared to the Italian regional average and the EU targets. As there are no provincial data that can be aggregated to obtain results for the metropolitan area, the minimum available aggregation level is regional, so these are the data that are used here, to give readers at least partial information. At the end of 2005, Italian R&D expenditure

represented 1.1% of GDP, significantly lower than the EU15 average of 1.97%. Within Veneto, this percentage fell to 0.6% of regional GDP.

Inclusion in the new economic paradigm

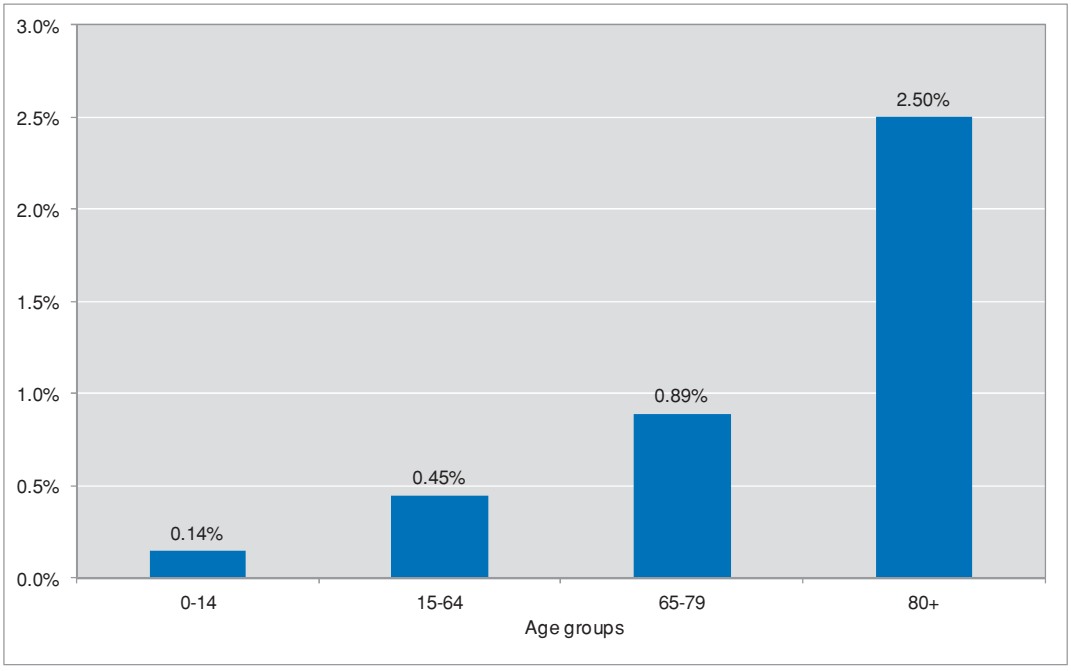
The economic shift towards a knowledge-intensive economy combined with the demographic changes has changed the skills needed for the regional economy. As previously noted, only 6% of the labour force is university-educated, which raises concerns for creating the next generation of knowledge workers. Venice's metropolitan region has partially buffered itself from Italy's demographic predicament by absorbing young immigrants, which has created a more diverse region and raised the area's rate of population growth (1.2%), which exceeds the national average (0.8%). Indeed, the arrival of immigrants has partially offset the shortage of local labour and provided a new source of entrepreneurism, especially in the province of Treviso, where at least 9% of the population is foreign-born.[22] However, as will be discussed later, new questions of immigrant settlement patterns, integration, and language and skills acquisition have become increasingly important.

Venice's historic centre has an ageing labour force – the average age in 2009 is 49 years and rising[23] – which faces unique challenges. Its labour market is characterised by an older group that often lacks employable skills and a younger population that enters the labour force at an age older than its OECD counterparts. Today, unlike the provinces of Treviso and Padua, the province of Venice has a demographic deficit and appears destined to experience a greying of its population. From 2002 to 2009, the population of working age adults grew by 0.45% and the population of seniors expanded at a faster rate (Figure 1.29). In 2007, 471 more people died than were born in the province of Venice (ISTAT, 2009c). In Venice, the significantly larger incidence of the elderly population, coupled with the higher costs of housing and living in general and the physical constraints on mobility imposed by the unique environment, have created a special category of marginalised people.

To confront the increasing competitiveness of Eastern European and Asian companies and to integrate their firms into global markets, firms are required to develop complex managerial skills. A complex framework of innovative practices underlies the shift towards knowledge-based production. Within firms, this has included such shifts in technology and innovation as companies develop their R&D departments and develop co-operative research agreements with universities. More companies have also developed their foreign sales networks and invested in product design and innovation. Leading businesses have also adopted ICT technologies like enterprise resource planning (ERP), e-mail, web sites, groupware, intranet, extranet for suppliers, extranet for sales networks, supply chain management, sales force automation and customer relationship management (Chiarvesio *et al*., 2004, 2010).

The Venice city-region is blessed with a high endowment *in loco* of the "creative class" whose involvement needs to be sustained. The region enjoys a density of creative people (*creativi*) that is hard to match, as measured by the number of high-value productions of clothing, leather goods, glasses and art glass, furniture and art ceramics and more. What is of even greater significance is that the *creativi* are mostly not "imported" but local, and that when they are from elsewhere, surveys indicate that they are locally attached to the densely urbanised countryside space and historical towns of the

Figure 1.29. **Population growth in Venice municipality by age group, 2002-2009**



Source: Servizio Statistica e Ricerca Comune di Venezia (various years).[24]

Venice city-region. The creative production clusters of the Venice city-region now have better connections with the international marketing cluster of Milan or other creative production clusters such as Florence, all of which facilitates their retention in the area. To remain in the Venice city-region, however, firms will need additional "managerial skills", especially in knowledge codification and market system design.

Spatial and infrastructure constraints

The economic development model the region has pursued has been responsible for the depletion of rural land, an irrational use of the infrastructure network, as well as a shift in the centre of gravity of the Venice city-region to Mestre, a neighbourhood of Venice located on the mainland and connected to the historic centre by bridge. The most recent figures for the distribution of land use across the Venice city-region date to a survey conducted in 2000 comparing the incidence of land use to that in 1990. During the 1990s, 2.1% of agricultural land was lost to other uses, perpetuating a trend from the previous two decades. Rural land has also been consumed to accommodate the growth of main seaside resorts such as Bibione, Caorle, Jesolo, Cavallino north of Venice and Sottomarina in the south, which are largely disconnected from public transit and automobile-dependent. The process of land consumption caused by the diffused spatial pattern of production activities has been supported by local municipal zoning practice of over-emphasising industrial use designations in their plans when submitted to the regional and provincial governments for review and approval. Traditionally, land use plans met opposition, and farmers were allowed to disregard plans, which produced a discontinuous development of scattered activities throughout the region.

Equally important, the Venice city-region may not be exploiting existing agglomeration effects, or building new ones, which are available to individuals and firms in large concentrations such as the Venice city-region. In particular, through stronger metropolitan integration the Venice city-region's firms could benefit from *i*) *economies of scale*, which would allow them to produce goods more cheaply; *ii*) *economies of scope*, which arise through the diversification of activities via inter-firm linkages across the metropolitan region; and *iii*) *externality effects*, which relate to the advantages gained through proximity to diversified businesses and market opportunities (Stimson *et al*., 2006).

Limited railway capacity and increasing car ownership has led to a doubling of traffic from 1990 levels. The rate of motorisation in Veneto rose 29% from 1994 to 2007 and stood at 0.8 cars per capita in 2007, which is roughly equal to the Italian median. The rate of passenger traffic increased by 96% from 1990 to 2003, and in 2003, 732 500 passenger vehicles used Veneto's road system daily. The rate of truck traffic (*traffico autostradale pesante*) rose by 102% from 1990 to 2003, and in 2003, 246 000 trucks used Veneto's road system daily (Regione del Veneto, 2007b).[25] The dramatic increase in heavy traffic was due, in part, to the Italian State Railways' downgrading of the railway link to the Port of Venice, which effectively removed the station area devoted to port trains and prioritised track allocation to other ports. While a decade ago, more than 60 trains left the Italian State Railways station, currently no more than 20 operate from the port station. Effectively, this has shifted the transport of goods from railways to highways, thereby increasing traffic congestion.

Infrastructural constraints

A major challenge facing the region is how to adapt the existing infrastructure network to create synergies and foster agglomeration economies when nodes are not connected. The continuous, low-density growth model that gradually developed in the Venice city-region created traffic congestion, higher infrastructure expenditure and an absence of centrality. Improving the infrastructure network is therefore key for better integration. The Venice city-region is endowed with a greater availability of infrastructure than the regional average in Italy. Data from the Istituto Guglielmo Tagliacarne (2007) makes it possible to compare the overall infrastructure available in the metropolitan area and the average for Veneto and Italy. According to this database, the city-region has 65% more infrastructure – in the railway, road networks, sea ports, air ports, energy plants and telephony infrastructure – than the national average. However, weaknesses include:

i) An inadequate rail system for intra-metropolitan mobility and synergies.

The rail system has failed to give the Venice city-region a sufficient degree of intra-metropolitan connectivity. The road systems in the provinces of Padua, Treviso and Venice now provide more connections to their main cities than to an integrated metropolitan network. Consequently, there are dozens of overlapping transit agencies, which do not provide a coherent, metropolitan policy. The city-region lacks a unified fare system and connections between road and rail transit. These gaps have been acknowledged by Veneto's policy makers, who in 2005 launched the ambitious Regional Metropolitan Railway System (SFMR). This project has recently broken ground, and it remains to be seen if it can re-organise the metropolitan transportation system to ensure mobility.

ii) A railway system disconnected from the city-region and larger urban networks.

The Venice city region is relatively disconnected from the north-west Italian and European urban system. The Venice city-region has no high-speed rail connection to Milan, though a project for the Padua to Verona link, which would connect the region to Milan, has been proposed but not financed. Only a small proportion of the goods produced in the north-eastern Italy pass through Venice's port: of the 1.3 million containers originating from the north-east, only 25% pass through the Port of Venice each year. The rest goes through the Tyrrhenian ports, such as Genoa, and the northern European ports. Likewise, the Venice city-region's rail network is not well integrated into two larger Trans-European Networks in the Transport Sector (TEN-T) projects. These include the east-west axis of Lyon-Trieste-Ukrainian Border (TEN-T Priority Project No. 6)[26] and the north-south axis of Berlin-Verona/Milano-Palermo (TEN-T Priority Project No. 1).[27]

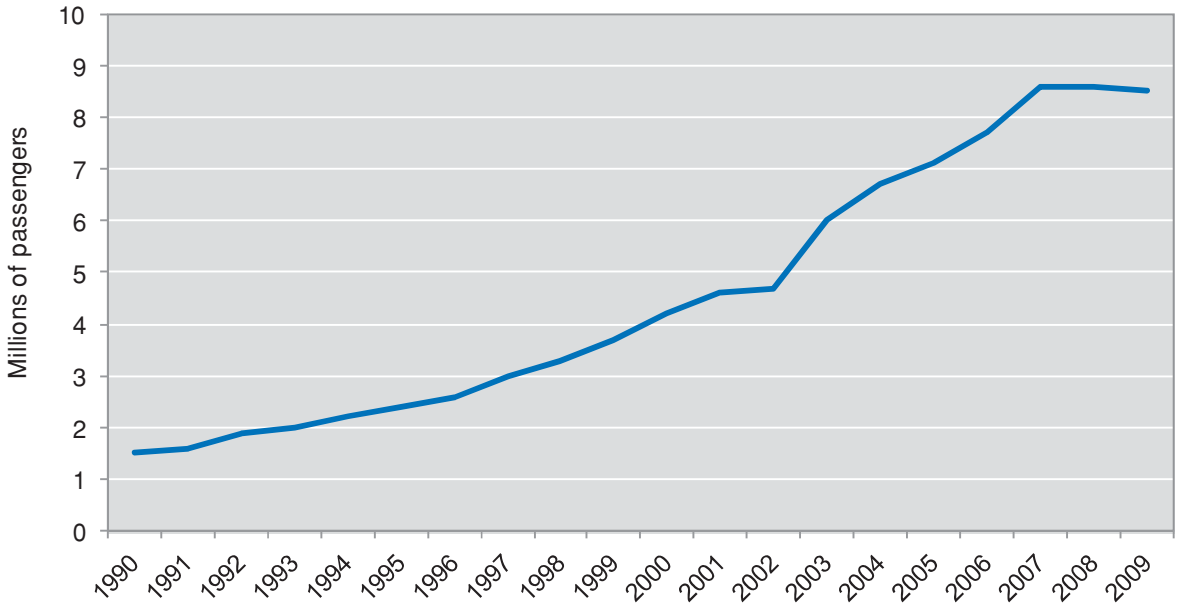
iii) Increasing road traffic and congestion.

Though several infrastructure improvements have broken ground, the city-region's road system is under considerable strain. In terms of strengths, the Mestre Bypass, a stretch of 30 kilometres of highway that operates as a beltway connecting Mestre to Treviso, was completed in 2009 and is expected to cut transit times in the city region and alleviate the congestion that has afflicted Mestre's road system. This is meant to counteract rising traffic, which rose by 150% across the Veneto from 1985 to 2000. Traffic particularly grew in the Mestre to Belluno highway, which witnessed a threefold increase from 1985 to 2000 (Veneto Region, Piano Regionale Trasporti, 2007 on CCIAA data).

iv) Closed systems: gaps between airports and railways.

Two airports, one in Venice and the other in Treviso, have witnessed a growth in passengers, but remain disconnected from railways, which limit their freight capacity. The Venice hub, the city-region's main airport and Italy's third-largest airport, has been experiencing positive growth trends and is mainly used by non-low-cost companies for chartered and scheduled flights, in addition to being the freight hub for the north-east of Italy. In 2009, 8.5 million passengers landed in the airports of Venice and Treviso, a more than fivefold growth since 1990 (Figure 1.30). Treviso airport has grown remarkably in recent years and is generally used by low-cost carriers. Treviso's airport processed 1.8 million passengers in 2009, a growth rate of 26.9% from 2005 (Assaeroporti, 2010). As for the transport of goods, Venice ranks fifth and Treviso ranks ninth in Italy. There are concerns, however, that the airports are not adequately serving the Italian market, due to the lack of logistical infrastructure to facilitate the transport of goods once they have been unloaded at the airport. Indeed, in 2007, the airports processed 11% fewer tonnes of freight than they did in 2006. Currently, the railways are not connected to the airports in either Treviso or Venice, though future plans will attempt to remedy these weaknesses.

Figure 1.30. **Growth in passengers to the Venice and Treviso Airports, 1990-2009**



Source: Assaeroporti (2010), "Dati di Traffico", *www.assaeroporti.it/defy.asp* and adapted from Scheppe, W. and IUAV Class on Politics of Representation (2009), *Migropolis. Venice: Atlas of a Global Situation*, Hatje Cantz/Fondazione Bevilacqua la Masa/Comune di Venezia, Venice.

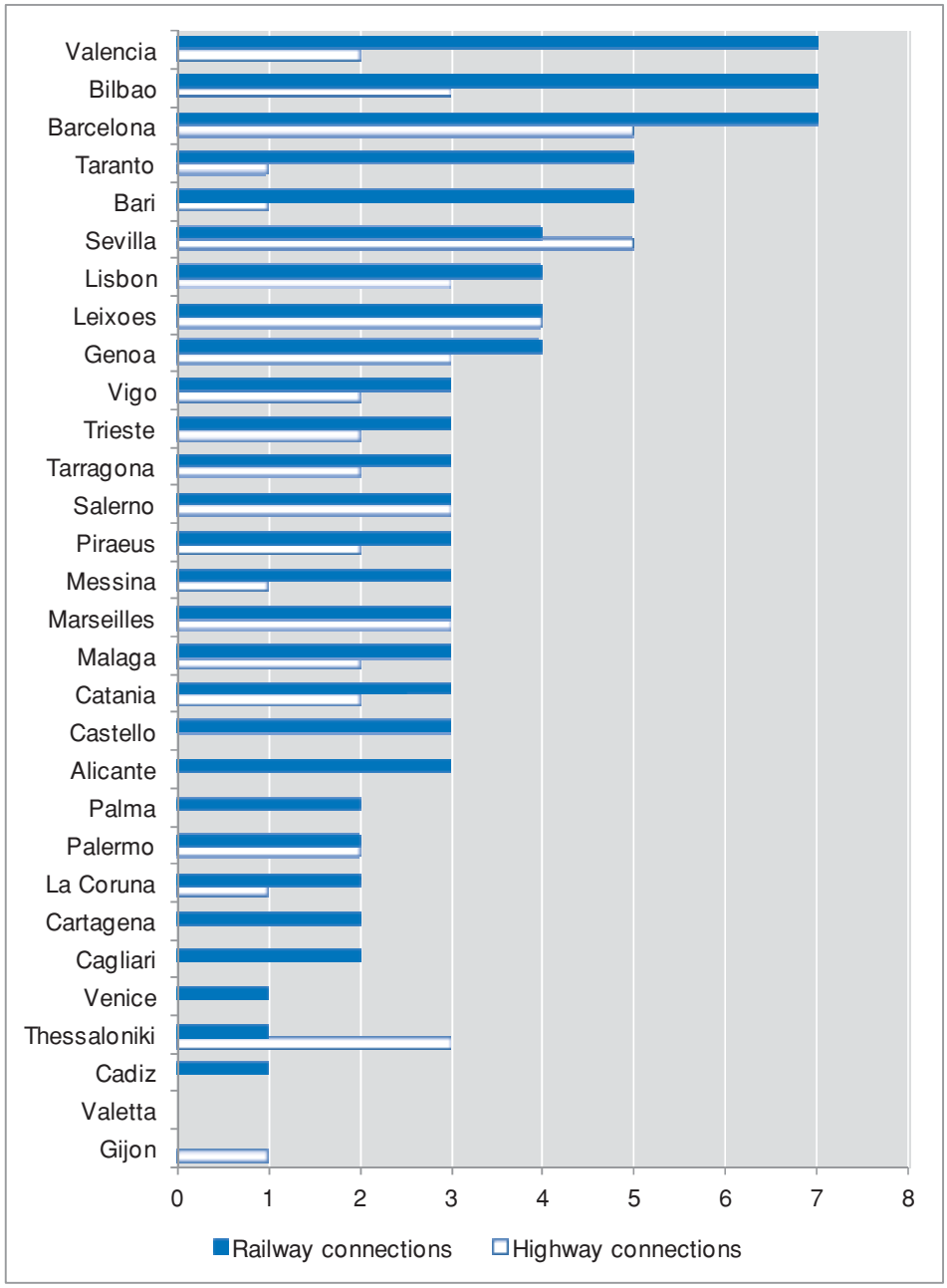
v) Lack of hinterland connections to the Port of Venice

Although Venice's port scores reasonably well on several port performance indicators, lagging hinterland connections constrain its competitiveness. It is located in the centre of the city-region, 37 kilometres from Padua and 30 kilometres from Treviso. The Port of Venice ranks sixth among Italian ports and 31st in Europe, with more than 30 million tons of traffic per year, ranging from oil products to passenger cruises – in which it ranks second in Italy and third in the Mediterranean. The number of direct calls for the port of Venice was 21 in 2005, comparable to Trieste, and better than many other ports in the Mediterranean, although far behind the largest ports (such as Genoa, which had 143 direct calls). On other indicators, the scores of the Port of Venice are less impressive. The terminal length of the Port of Venice is relatively limited, whereas the maximum depth is average in Mediterranean perspective, but far behind Trieste, a close competitor (Figure 1.31). The most serious constraint for the development of the Port of Venice appears to be the lack of hinterland connections, in comparison to almost all Mediterranean ports (Figure 1.31).

Venice's port is facing the limits of its infrastructure. First, its role has been restricted to vessels of less than 9.5 metres' draught, which has compromised its competitiveness. However, it should be noted that dredging is planned to resolve this limitation. Second, thanks to the decline of the railways, the port has experienced difficulties of road access as a result of traffic congestion. Because of these limitations, only a third of the sea and port traffic generated by the Veneto economy leave the port of Venice. The rest reaches

the Port of Trieste and is routed through ports on the Tyrrhenian coast on the other side of the country, causing traffic jams and obstructing train routes. This issue is becoming more important as trade grows with Eastern Europe, the Balkans and across the Mediterranean.

Figure 1.31. **Highway and railway connections of Mediterranean ports**



Source: Adapted from Ducruet, C. (2006), "Port-city Relationships in Europe and Asia", *Journal of International Logistics and Trade*, Vol. 4, pp. 13-35.

vi) The stress of nearly 40 million tourist visits a year

Tourism has grown at a meteoric pace in the Venice city-region. Tourists account for approximately 30% of the daily city users (Table 1.5). Every day, nearly 50 000 tourists can be found in historic Venice or the island, whose total real population amounts to approximately 143 000 city users daily. The tourists' expenditure is much higher than that of the residents. It is estimated, for instance, that out of the total expenditure in public establishments, over 76% is attributable to tourists, while tourists account for over 55% of daily expenditure in the commercial sector. It is clear that, in Venice's historic centre, business and public establishments depend heavily on tourism; indeed, overnight stays by tourists between 1951 and 1995 grew tenfold (Figure 1.32).

Table 1.5. **Daily population equivalent in the Venice municipality, 2007**

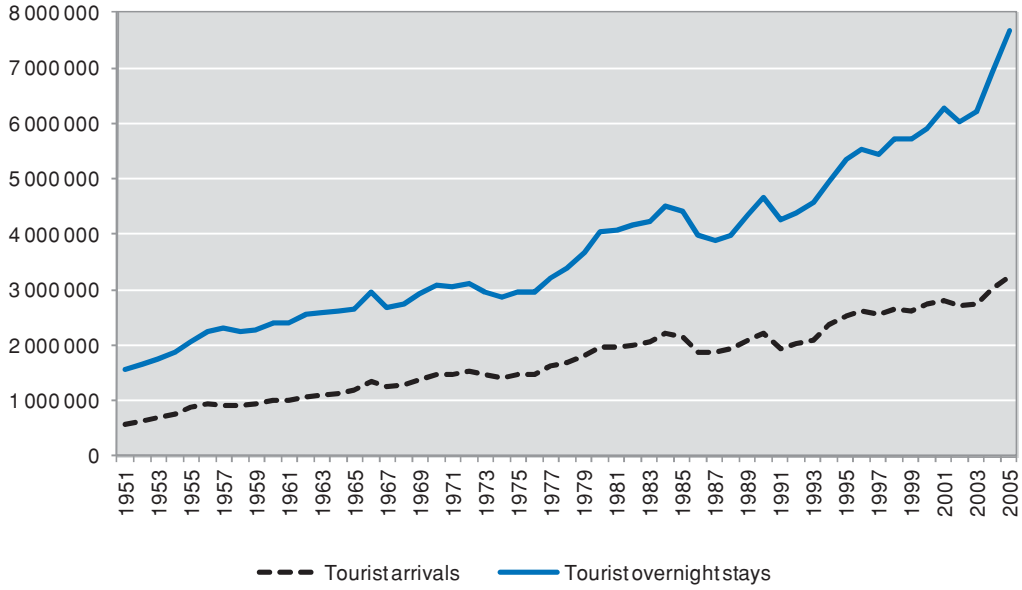
Population group	Historic city and islands		Venice municipality	
	Absolute value	Population equivalent	Absolute value	Population equivalent
Residents	70 594	67 693	268 934	257 882
Second home owners	13 284	4 731	22 894	8 154
Undergraduate students	5 937	3 416	7 254	4 174
Tourists (overnight visitors)	5 387 695	14 761	8 245 154	22 589
Tourists (day-trippers)	11 751 000	32 195	11 751 000	32 195
Commuters (study)	11 053	6 359	13 602	7 826
Commuters (work)	20 068	14 295	30 437	21 681
Other*	-	-	11 224	11 224
Total population equivalent		143 450		365 724

Notes: *Other refers to such categories as soldiers based in military installations and hospitalised and incarcerated populations.

Source: Various sources synthesised in Di Monte, G. and G. Santoro (2008), "Venezia: quartiere metropolitano", COSES document 1032.0, Venice.[28]

Historic Venice has witnessed the conversion of the built environment to accommodate tourists. A hotel can be a very profitable enterprise in Venice: according to Deloitte (2009), the average hotel room rate in 2008 was USD 275 and the average revenue per room was USD 174 (Figure 1.33). Tourist businesses, such as souvenir shops, grew by 265% from 1976 to 2007. The rate was even higher for areas such as San Croce, which has six shops in 1976 and 49 today (Zanini, 2008). Large increases have been recorded for non-hotel-type establishments, including rented rooms, holiday houses, bed and breakfast establishments, youth hostels, religious institutions offering hospitality and residential study centres. The number of non-hotel-type establishments grew from 142 to 1 408 from 2000 to 2007, a more than tenfold increase. According to one estimate, the private housing stock lost 420 homes for this reason. The value of residential property in Venice has more than doubled since 2000, largely as a result of the tourist economy (Da Mosto *et al*., 2009). Critics argue that such a transformation has changed the rich functional texture of the Venice city-region's historical cities, which have partially lost their long-standing function as all-purpose urban centres. The mix of urban uses that the American urbanist Jane Jacobs argued is the soul of great cities and of public spaces in great cities is slowly disappearing in historic Venice.

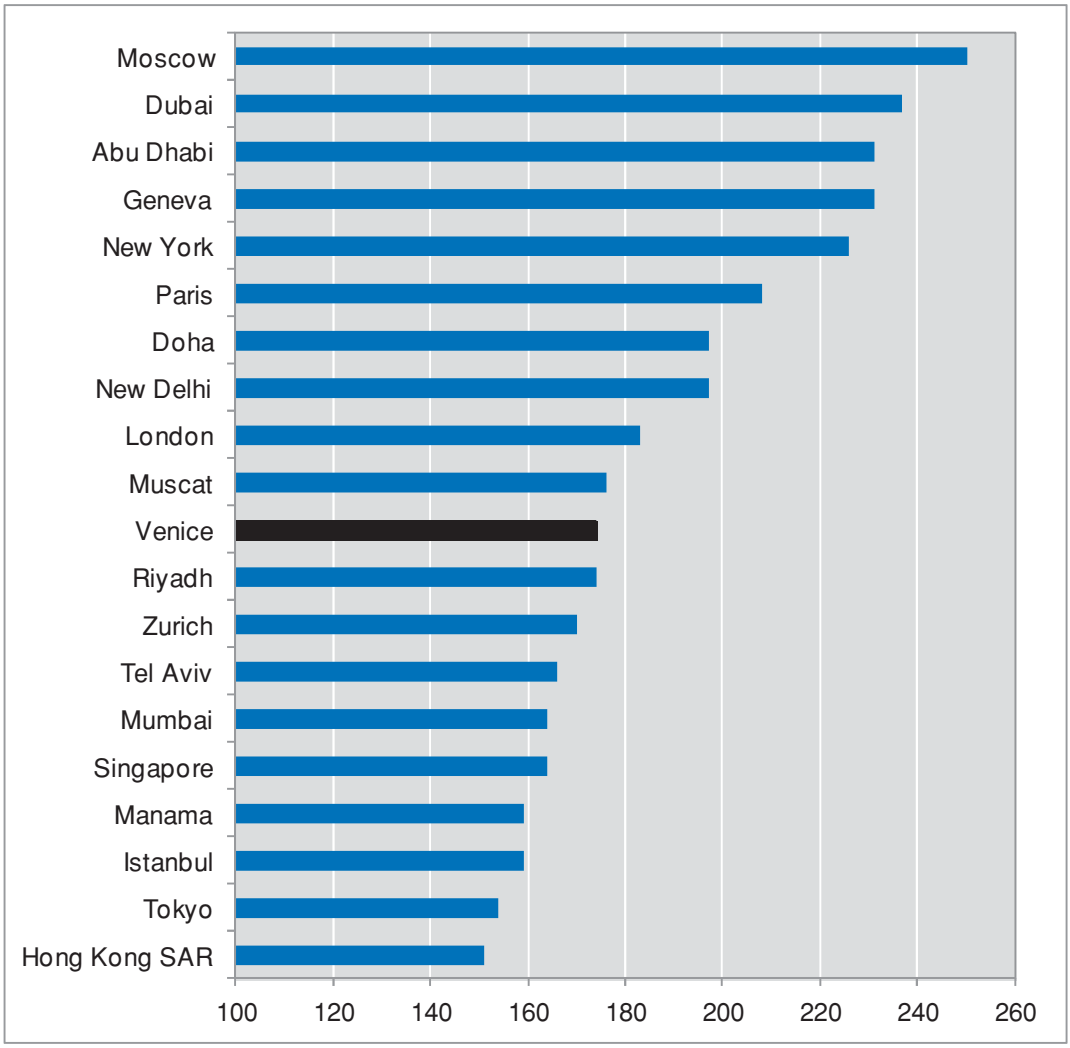
Figure 1.32. **Tourism flows in the Venice municipality, 1951-2005**



Source: Adapted from Scheppe, W. and IUAV Class on Politics of Representation (2009), *Migropolis. Venice: Atlas of a Global Situation*, Hatje Cantz/Fondazione Bevilacqua la Masa/Comune di Venezia, Venice.

Though tourist services are concentrated in the historic town centre of Venice, tourists are increasingly travelling to other sites in the Venice city-region.[29] Many hotels have recently been constructed in Mestre, which offers advantages in terms of space and price. Likewise, a larger share of tourists chose to stay in Padua and Treviso, whose hotel prices are considerably less than those of Venice.[30] The provinces of both Venice and Treviso witnessed a growth in tourism from 2000 to 2008. Regional tourist flows especially benefit from metropolitan transportation improvements, such as the improved connections between Padua and Venice. Data on the arrival of tourists shows a 13.2% growth in tourists from 2000 to 2008 and an even larger growth rate for certain groups, such as those who are visiting from outside the EU (Table 1.6). Similarly, data collected by the Veneto Region show a growth of tourist flows in the metropolitan area from approximately 35 million in 2000 to 40 million visits in 2008. Nevertheless, most research seems to confirm Russo's (2001) point that "tourism revenues spread again to the rest of the region, while costs remain concentrated". Historic Venice is particularly affected by a large stream of waste from visitors and the increase in land prices, due in part, to the demand for hotels and other tourist facilities.

Figure 1.33. **Revenue per available hotel room (USD), 2008**



Source: Deloitte (2009), "Hospitality Vision: Global Performance Review", *www.deloitte.com/assets/Dcom-Global/Local%20Assets/Documents/Global%20Performance%20Review%202009(9).pdf*.

Table 1.6. **Tourist visits in the Venice city-region: 2000, 2008**

	Province of Venice		Province of Padua		Province of Treviso	
	Visits (2000)	Visits (2008)	Visits (2000)	Visits (2008)	Visits (2000)	Visits (2008)
Europe	16 224 544	18 823 588	2 359 365	1 725 645	405 109	520 941
Americas	1 612 803	1 838 684	125 625	108 404	60 949	77 781
Japan	372 304	299 424	20 066	16 555	10 045	12 726
Australia	198 226	277 873	9 031	10 728	6 943	13 143
Other extra-European	481 006	775 491	109 179	148 952	74 131	84 176
Total foreign	18 888 883	22 015 060	2 623 266	2 010 284	557 177	708 767
Total Italian	10 102 177	11 513 819	2 050 396	2 454 387	723 800	839 215
Italy + foreign countries	28 991 060	33 528 879	4 673 662	4 464 671	1 280 977	1 547 982

Note: "Visits" or *presenze turistiche* are calculated by multiplying the number of tourists by the number of days tourists spend in a given destination.

Source: Regione del Veneto (2009), "Movimento turistico nel Veneto", *http://statistica.regione.veneto.it/turismo2.jsp.*

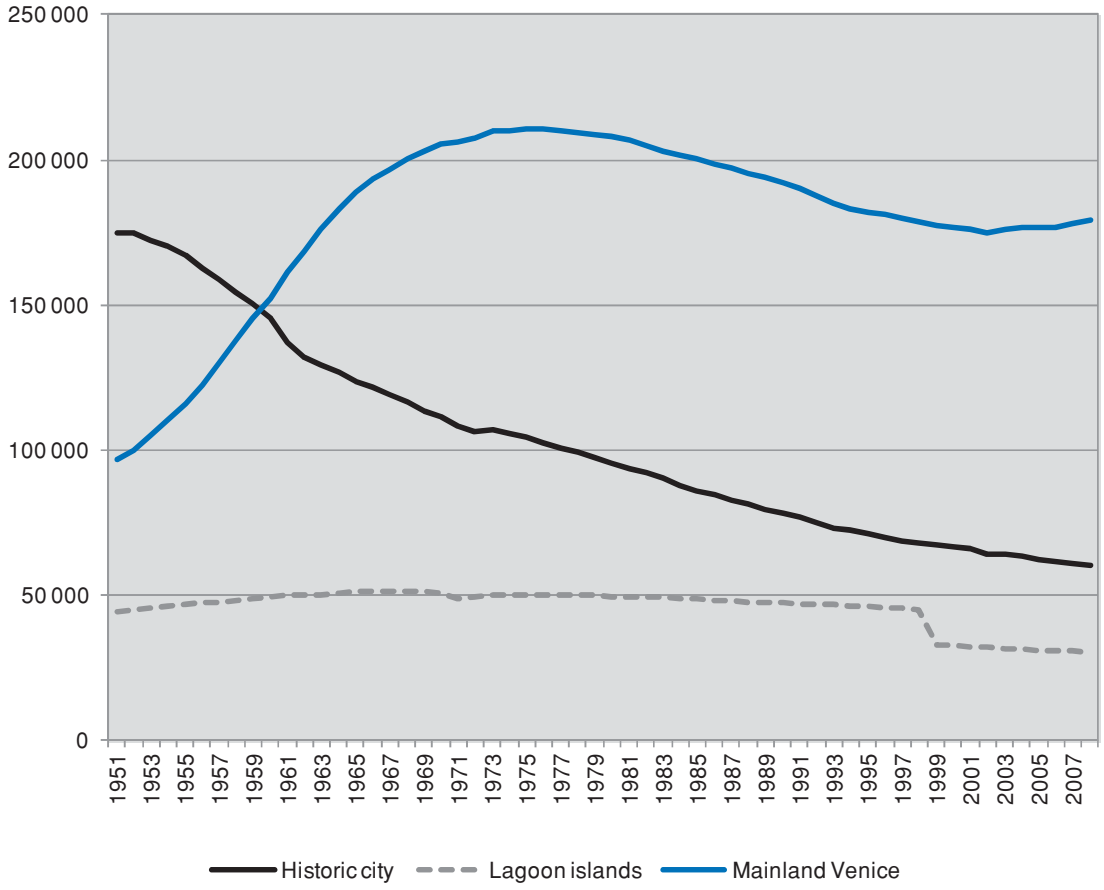
New spatial pattern – a sprawling city region without a centre

Over the past four decades, the Venice city-region has followed a polycentric spatial development, which may have increased capital costs related to service provision and decreased the vitality of downtown areas.[31] A diffusion of economic activity accelerated in the Venice city-region, especially the province of Venice. Whereas in 1971, 61% of jobs in the province were concentrated in the Venice municipality, by 2001, this had fallen to 41% (Gibin and Tonin, 2009). The type of uncontrolled development throughout the city-region may be associated with greater capital costs related to building more schools and extending roads, water and sewer lines and storm water drainage systems, as found in the United States (Burchell *et al.*, 2002).[32] Without a true downtown, the city-region may fail to create a spatial environment for the transfer of ideas across diverse sectors. Whereas the Venice city-region's industrial districts have benefitted from locating in smaller towns, the services sector may need a downtown to pool talented professionals in the field.

Much of the population of the historic city of Venice has relocated to the mainland because of its lower housing costs and increasing employment opportunities, which has shifted the centre of the city-region's gravity to Mestre. While the historic or "amphibious" section of Venice had over 180 000 residents in 1950, by 2000, only approximately 60 000 remained (Figure 1.34). Conversely, Mestre's population rose from about 90 000 in 1950 to 200 000 in 2008. Mestre offers a higher level of moderate-cost housing and employment opportunities. Mestre also avoids the logistical difficulties posed by a city built on water with limited commercial and industrial space and parking, and rigid historic building codes. A rapid transformation is occurring in Mestre, thanks to investments in the new airport terminals connected to Venice through Mestre, and the construction of a university, hospital and science park. Tourists are also beginning to stay in Mestre: over 2.5 million stayed overnight in 2007, as compared to 9 million in historic Venice.

The evolution of the regional economy, coupled with the de-industrialisation of heavy industry, has also led to the formation of brownfields. Among the most noteworthy are those of Mestre and Port Marghera. The process of de-industrialisation in the last decades has reduced the size and number of the large and smaller manufacturing industry sites in, for example, Mestre and islands of the Venice Lagoon. The attendant process of closing down institutional and obsolescent buildings in the centre and the peripheral areas of cities have left many "brownfields" or vacant built-up spaces throughout the Venice city-region ripe for re-use. Many of these sites are in the planning stage, and more are coming on board. All of this constitutes a pool of resources to be invested in mixed-use redevelopment schemes consonant with the new strategic regional planning objectives of densification and sustainable economic activities. One significant project is the San Giuliano Park, a 700-acre park that was formerly used as an industrial waste landfill and later as an urban waste landfill. The environmental clean-up of the brownfields and its transformation into one of Europe's largest urban parks started in the mid-1990s and entailed the construction of an underground facility to permanently store waste which could not be recycled.[33] The future of the massive remaining site of Port Marghera, however, is still a matter of ongoing political debate, but the incremental recovery of its polluted and unused areas is proving to be a successful strategy.

Figure 1.34. **Population flows in the Venice municipality, 1951-2008**



Source: Da Mosto, J. *et al.* (2009), *The Venice Report: Demography, Tourism, Financing and Change of Use of Buildings*, Cambridge University Press, based on data from the *Comune di Venezia.*

Environmental sustainability

The Venice city-region's high level of land consumption – both rural and urban – has in particular cases compromised the quality of soil, water, air and beaches. This is happening in the context of extreme vulnerability of the ecosystem. The Venice city-region is one of the most ecologically sensitive areas in the world. The Venice Lagoon system is a distinctly anthropicised environment, the product of centuries of human interventions aimed primarily at maintaining the intermediate lagoon state between continent and sea. Air quality has also been compromised through the high volume of car trips every day. Together, these raise the cost of insurance, pose health risks and infringe on the attractiveness of the city-region, not an asset for a region that relies so heavily on tourism. The effects of extreme flooding have caused property damage throughout Venice, as in the 1966 flood.[34] This also has implications for the viability of the city itself, which relies on Lagoon functions for water treatment and for the attenuation of tides.

Region-wide environmental sensitivity

Vulnerability to climate change. The Mediterranean basin is one of the area's most sensitive to climate change. According to the Intergovernmental Panel for Climate Change (IPCC), it is predicted to register warming above the global average, increased frequency of heat waves and lower rainfall. The National Research Council's analysis of climate data for Italy for the past 200 years shows an increase in the national average of 1.7°C relative to pre-industrial times, rising especially sharply in the past 50 years (Ferrara & Farruggia, 2007). The 12 global climate models used in the IPCC Fourth Assessment Review indicated that for the Venice area, by 2100, alongside increased sea levels at the inlets there will be:

- a 3° to 5°C increase in air temperature;
- 10% reduction in rainfall;
- and an increase in solar insolation of the Lagoon.

Temperature rise and reduced rainfall is expected to significantly affect the Venice Lagoon, resulting in increases in salinity, nutrient concentrations and water temperature. Together with an unchecked rate of erosion of sediments from the Lagoon, which makes the volume of the water larger and residence times consequently longer, a series of negative feedbacks are possible in an already nutrient-rich system, leading to algal blooms, eutrophication and ultimately foul-smelling waters and a general degradation of habitat.

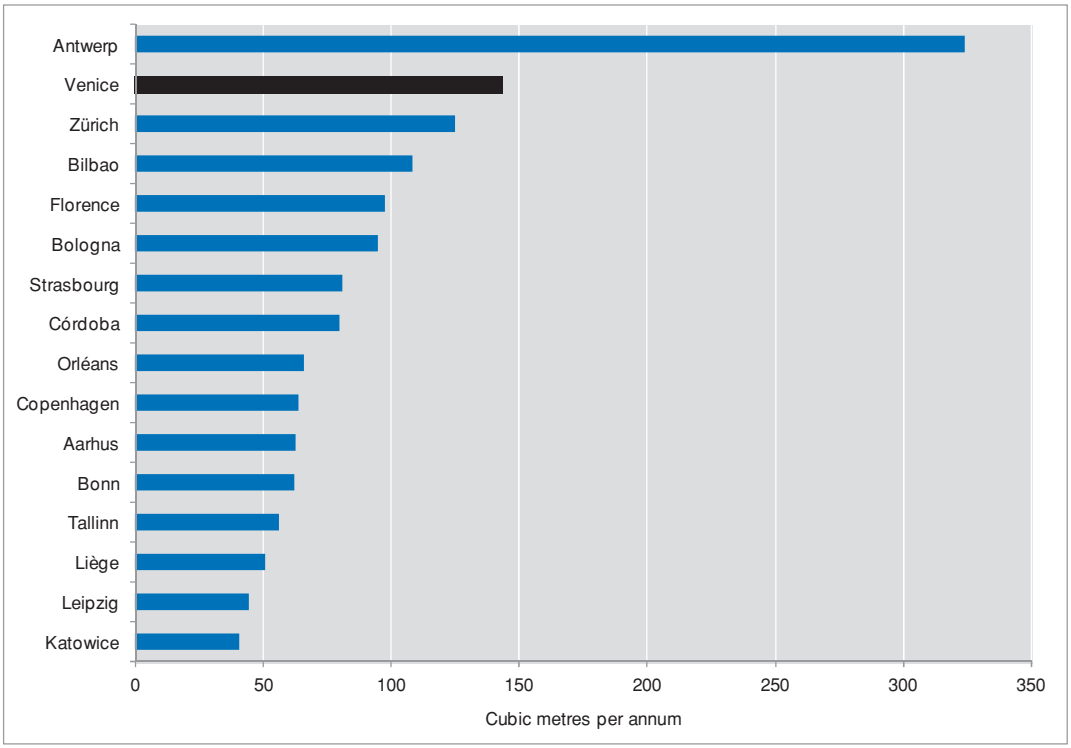
Polluted soil. Chemical and heavy industrial developments have left a legacy of polluted soil in the Venice city-region. Throughout the region, older and spatially diffused developments have created intermittent problems of soil contamination in surrounding rural spaces. Though many of the toxic waste sites in Port Marghera have been cleaned up or are due to undergo remediation, industrial pollution has impaired the soil quality of the city-region.

Strain on water resources and high network leakage. The spatial diffused mode of development has also generated heavy water consumption. Network leakage is still too high: the Venice municipality lost more than 37% in 2006 (Comune di Venezia, 2007). The municipality has one of the highest rates of water usage among its European peers, cities of between 250 000 and 499 999 (Figure 1.35). Part of the high water usage derives from Venice's large municipal network: It is 1 022 kilometres long and two-thirds of its area is located on the mainland and one-third on the historic centre and islands.

Poor water quality. Inadequate water quality is a key issue for the Venice Lagoon and is affected by the drainage basin, untreated sewage, atmospheric deposition and the release of contaminants sequestered in sediments originating from industrial activities, especially petrochemical processing in Port Marghera. Pollutant loads (direct and indirect) are 64% attributed to inputs from rivers of the drainage basin, 13% from Marghera, 6% from the historic centre and other inhabited islands, 4% from the Campalto water treatment plant and 13% from atmospheric deposition. Phosphates, nitrates and ammonia-based compounds are the main contaminants, along with metals. Seventy per cent of monitoring points in the Lagoon are classified as "bad"; 27% of the rest as "poor" and the remaining 3% "unattributed". Nowhere is the water quality "sufficient" or "good" (Rusconi, 2007). Sewage in the historic centre is untreated and flows directly into the Lagoon, which receives an organic and pathogen loading equivalent to more than 400 000 persons during the tourist season. Significant levels of hepatitis A and entero-

Figure 1.35. **Water consumption per capita, 2004**

Select EU municipalities with between 250 000 and 499 999 inhabitants



Source: Directorate-General for Regional Policy at the European Commission and EUROSTAT (2004), "Urban Audit", *www.urbanaudit.org*.

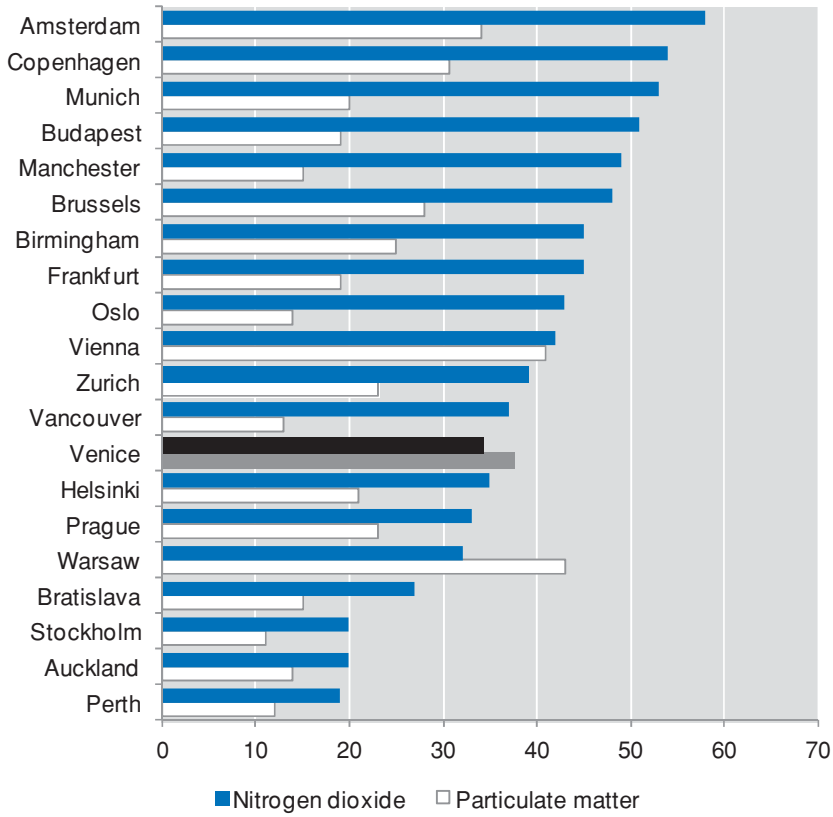
viruses have been detected in Venice's canals. Swimming in the canals is forbidden, but multiple exposure routes exist (through flooding, and also aerosol contamination due to boat disturbances of water) (Rose *et al.*, 2006). The Lagoon is still suffering from the legacy of petrochemical processing in Port Marghera, once the largest industrial complex in Europe, and its discharges of mercury, dioxins and hydrocarburants.

Decline in air quality. Air quality has declined in the Venice metropolitan region, as a result of industrial pollution in Marghera and increased automobile use. Port Marghera's main plants include a petrochemical industry (mainly chlorinated compounds), an oil refinery, industrial plants for the production and transformation of non-ferrous metals (aluminium, copper and zinc), thermal power plants and waste incinerators. Through using data from the Veneto Tumor Registry, oncologists in Veneto documented that residents with the longest exposure period and the highest exposure level in the area surrounding Marghera were at risk of developing a sarcoma, which was 3.3 times higher than the control group in the study area (Zambon *et al.*, 2007). Mainland Venice also has the highest asthma rate for all Italian children (Scheppe and IUAV, 2009). While nitrogen dioxide emissions are not a major concern – concentrations are on average below the legal limits for the protection of human health and there appear not to be high peaks – the presence of fine dust particle concentrations (PM_{10}) has exceeded legal level limits on many days each year. Specifically, in 2009 the PM_{10} rate exceeded limits on 102, 92, and 71 days in the provinces of Padua, Venice and Treviso, respectively (ARPAV, 2009). One key cause of the air pollution is the high volume of

automobile trips, due largely to the Venice city-region's sprawling spatial structure. Indeed, in 2003, traffic accounted for 29% of all PM_{10}, 64% of all carbon monoxide (CO), and 42% of nitrogen oxide (NO_x) emissions in Veneto (ARPAV, 2008a). Today, the Venice city-region's air quality is lower than that of cities like Zurich, Vancouver, Prague and Warsaw (Figure 1.36).

Figure 1.36. **Air quality in selected OECD cities**

Multiple years (2002, 2004, 2008)



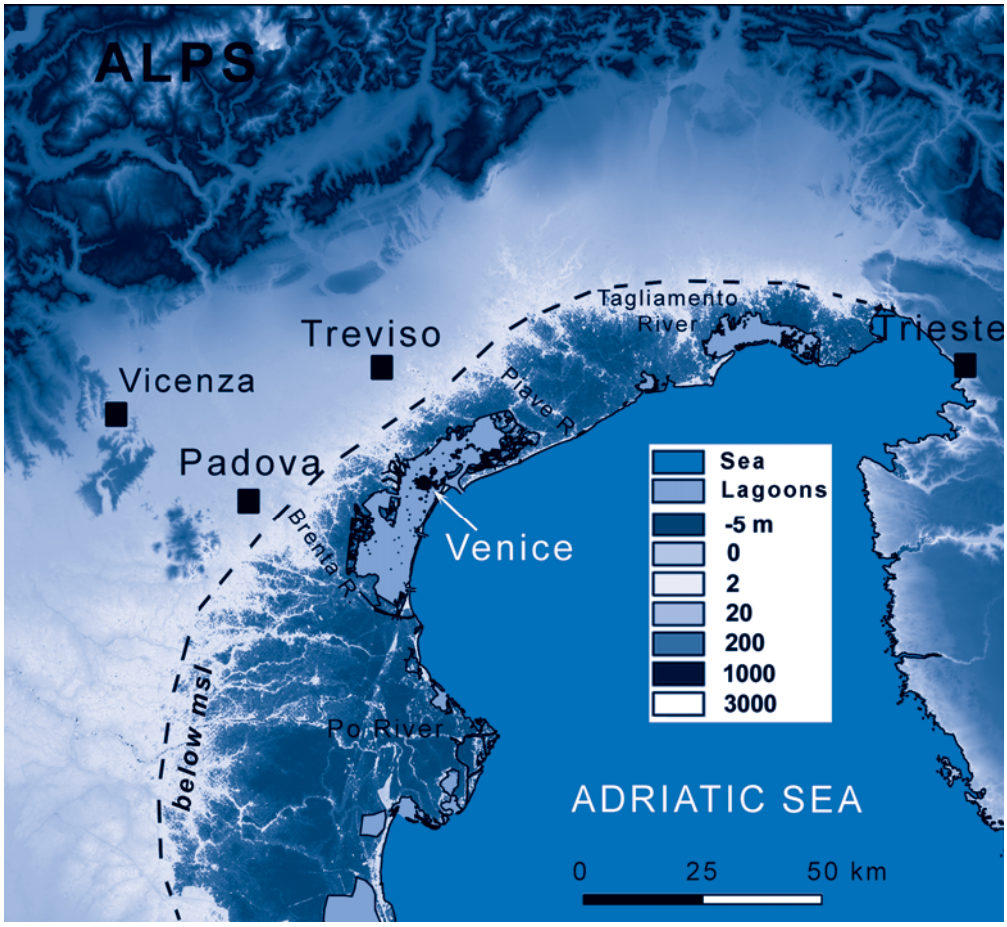
Note: This is a selection of cities in the OECD with fewer than 2.5 million inhabitants. NO_2 measurements for cities in the OECD derive from OECD Environmental Data Compendium 2002, EEA (AirBase), and national statistical websites (cited in OECD, 2005). They refer to 2002. Data on particulate matter concentrations are from Pandey *et al.* (2006) and refer to 2004. Data on the Venice city-region's particulate matter were obtained by calculating an average 2008 value from 23 air quality stations in the Venice city-region.

Source: OECD (2005), "Table 7: Urban Air Quality. Trends in SO_2 and NO_2 Concentrations in Selected Cities", in *Environment at a Glance: OECD Environmental Indicators*, OECD Publishing, Paris; Pandey *et al.* (2006), *Ambient Particulate Matter Concentration in Residential and Pollution Hotspot Areas of World Cities: New Estimates Based on the Global Model of Ambient Particulates (GMAPS)*, World Bank, Washington, D.C.; and ARPAV (2008), "Relazione regionale della qualità dell'aria. Anno del riferimento 2008", Regione del Veneto, Venice, *www.arpa.veneto.it/Download/Relazione_regionale_aria_2008.pdf*.

Hydrological vulnerability

Venice is surrounded by a lagoon about 50 kilometres long and 20 kilometres wide, the largest lagoon in Italy and the whole Mediterranean basin.[35] The tidal dynamics have shaped, and continue to influence, the historic centre of Venice and the other inhabited islands of the Lagoon (Caniato *et al*., 1995). The Lagoon drainage basin consists of a low gradient floodplain of about 2 000 square kilometres. A belt of spring sources in the northern part of the drainage basin provides a permanent freshwater supply that sustains the base flow of the network in the driest periods. A considerable fraction of the basin surface, particularly in the south and along the Lagoon border, is below mean sea level. These reclaimed lands have to be artificially drained by pumping plants, sluices and other hydraulic infrastructure. The morphological features and characteristics of the drainage system, combined with areas below mean sea level, intensive intervention to regulate flows in the manmade canals, tributaries and so on, and exchanges between sub-basins, produce a highly complex mesh of hydraulic pathways that require constant monitoring and regulation.

Figure 1.37. **Coastal areas at risk from storm surges and sea-level rise in northeastern Italy**



Source: Modified after Tosi *et al.* (2010), "Ground Surface Dynamics in the Northern Adriatic Coastland over the Last Two Decades", *Rendiconti Lincei – Scienze Fisiche e Naturali*, doi: 10.1007/s12210-010-0084-2.

Flooding in the Venice Lagoon is a well-documented phenomenon and results from a number of complex hydrological factors. Flooding is the result of the combined action of the astronomical tide (modest range) and storm surges from northern or north-eastern winds that push additional, greater volumes of water in through the inlets. When water begins to inundate the streets, squares and buildings, it is known as *acqua alta* in Venice. *Acqua alta*, in the form of moderate and extreme events[36], has occurred with increasing frequency over the past century, due to:

- natural and human-induced subsidence (ground compression caused by groundwater extraction);
- eustasy (rise in sea levels);
- morphological changes that have resulted in more water being exchanged between the Lagoon and sea, a reduced area for water to expand within the Lagoon, and reduced resistance from the Lagoon to attenuate tide levels.

Water levels in Venice Lagoon, along with the frequency of flooding, have risen at an alarming rate since the late nineteenth century. This is the result of major infrastructural modifications in the Lagoon, notably wider and deeper inlets, the dredging of the deep navigation channels, and extensive erosion, which has washed away approximately two-thirds of the salt marshes and increased average water levels in the open waters of the Lagoon. Consequently, more water comes into the Lagoon with each tide and storm surge. Average water levels are now almost 30 centimetres above levels in the 1880s, and the frequency of high-water events has increased more than tenfold when considered on a decadal basis from the 1880s (Figure 1.38). The frequency of water levels at 100 centimetres or above now easily exceeds 10 times per year (according to the 30-year average from 1980-2009). While the flood barriers of the MOSE system (standing for *Modulo Sperimentale Elettromeccanico*, or experimental electromechanic module) will defend Venice against extreme and exceptional flooding (Box 1.2), confronting chronic water damage and frequent moderate flooding is contingent on complementary efforts to raise banks and quaysides.

Box 1.2. **The construction of the MOSE flood barriers: the largest infrastructure project in Italy**

In 2003, after years of assessments and preliminary projects, the so-called "Super Committee for the Safeguard of Venice"* decided that an executive plan should be made to begin the construction of the MOSE system (the acronym stands for "experimental electromechanic module"; Mose is also the Italian name for the Biblical figure Moses). The main objective of this complex system of mobile barriers and associated engineering works is to protect the cities of Venice and Chioggia, the Lagoon's historical centres, as well as the broader Lagoon basin, from the detrimental effects of flooding. MOSE is not a single operation: it is part of the broader General Work Plan for the Protection of Venice and the Lagoon established by the Ministry for Infrastructure in 1987 together with Venice's *Magistrato alle Acque* (the local operational branch of the Ministry) through the concessionary *Consorzio Venezia Nuova*, a private sector consortium of construction and engineering firms. These works along the coast and in the Lagoon, some of which have been completed and others still in progress, exemplify the largest plan ever for the protection, restoration and repurposing of the environment carried out by the

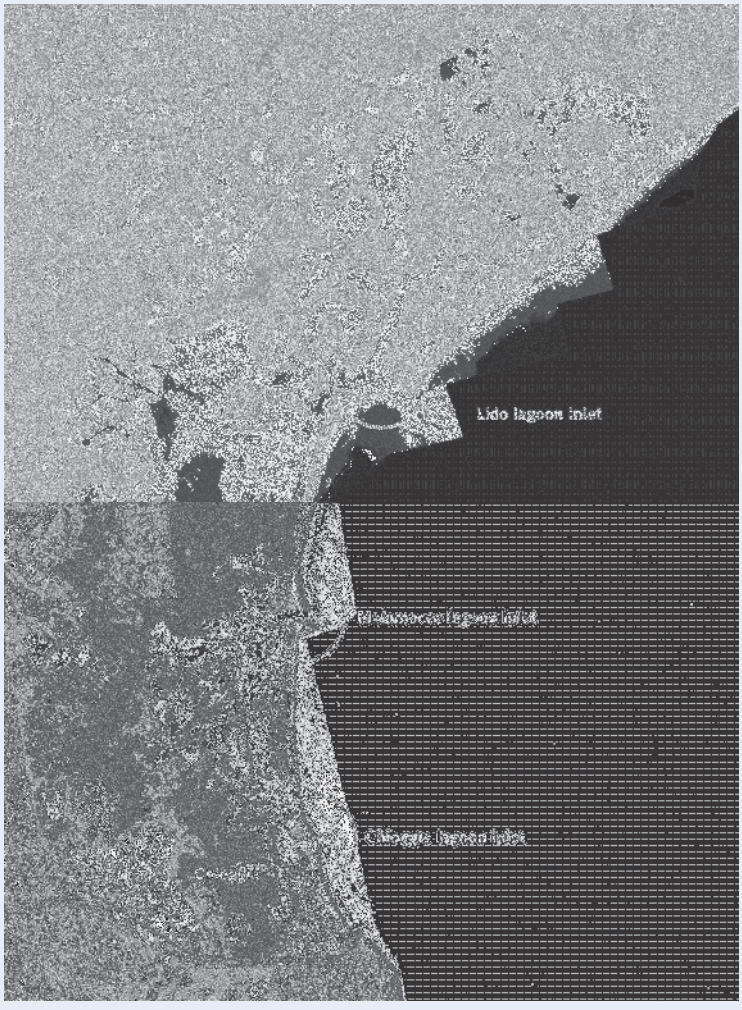
Box 1.2. **The construction of the MOSE flood barriers: the largest infrastructure project in Italy** (*cont.*)

Italian government. As of March 2010, impacts of these public works include:

- **1 400 hectares** of tidal mudflats, salt marshes and sandbars have been reconstructed and protected;
- **35 kilometres** of industrial channels and **five** former landfills have been sealed to prevent leakage into the Lagoon;
- **100 kilometres** of embankments have been rebuilt;
- **45 kilometres** of beaches have been created and **10 kilometres** of wharfs have been restructured.

The MOSE's mobile dams are designed to protect Venice and its Lagoon from tides of up to 3 metres high and from an increase in the sea level of at least 60 centimetres in the next 100 years. Even when the dams are up, the port will remain operational, thanks to a large shipping lock, whose construction is well under way at the mouth of the Lagoon at Malamocco.

Satellite image of the Venice Lagoon and the Port showing ongoing MOSE works

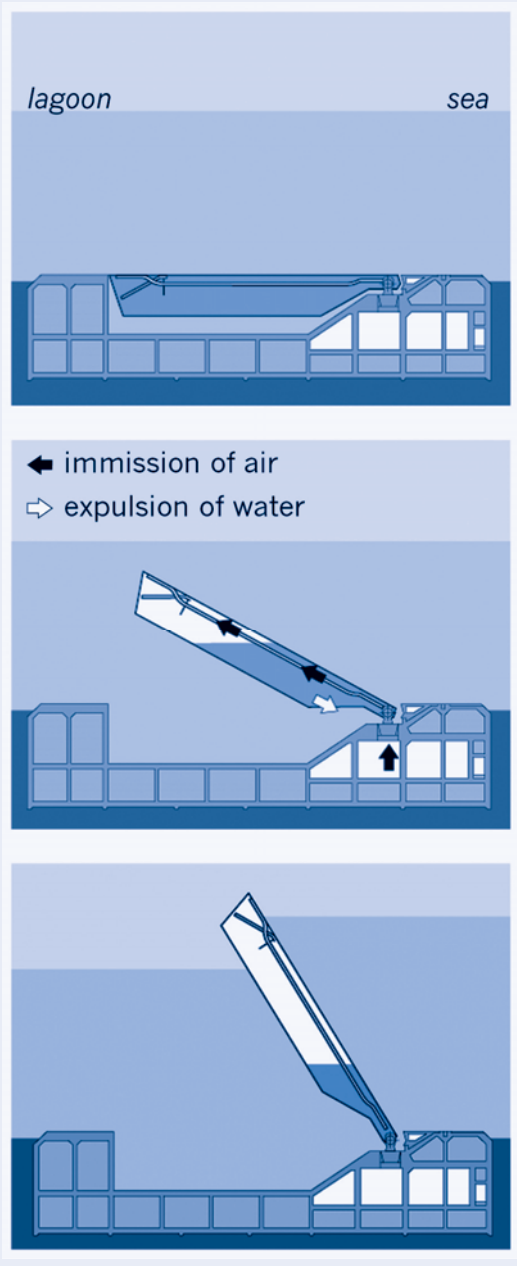


Source: IKONOS Satellite image (June/July 2007), adapted by the Venice Water Authority information service.

Box 1.2. **The construction of the MOSE flood barriers: the largest infrastructure project in Italy** (*cont.*)

The MOSE project incorporates an innovative design where the system is mostly permanently underwater. The floodgates that make up the moving dams are normally filled with water and lie in their housing on the seabed at the port mouths. To activate them, compressed air is pumped in to discharge the water. As the water is discharged, the floodgates rotate along the axis of their hinges and rise to a vertical position to stop the tidal flow from entering the Lagoon. When the tide falls and the Lagoon and the sea reach the same level, the floodgates are once again filled with water and plunge back down into their housing.

The MOSE floodgates



Source: Courtesy of Consorzio Venezia Nuova, 2008.

Box 1.2. **The construction of the MOSE flood barriers: the largest infrastructure project in Italy** (*cont.*)

The final cost of this enormous operation, under construction by the Consorzio Venezia Nuova, the sole concessionary for the Italian government, is budgeted at EUR 4.678 billion. To date, financing worth EUR 3.244 million has been secured by the CIPE (the Inter-ministerial Committee for Economic Planning), of which EUR 2.949 million has been invested. In January 2010, 63% of the work was completed. More specifically, 90% of planned above-water works has been completed and is visible at the three port mouths. The MOSE is expected to be operational in 2014, and the associated maintenance activities, such as the management and monitoring of the Lagoon, will be based in the northern part of the Venice Arsenal. The Consorzio Venezia Nuova is specifically committed to the restoration and restructuring of 125 000 square metres in the Venice Arsenal, including six warehouses in the Tese Novissime. These will be used to host the management offices and monitoring activities for the Lagoon system, which will also provide for the necessary maintenance services for the floodgates in the years after its start-up.

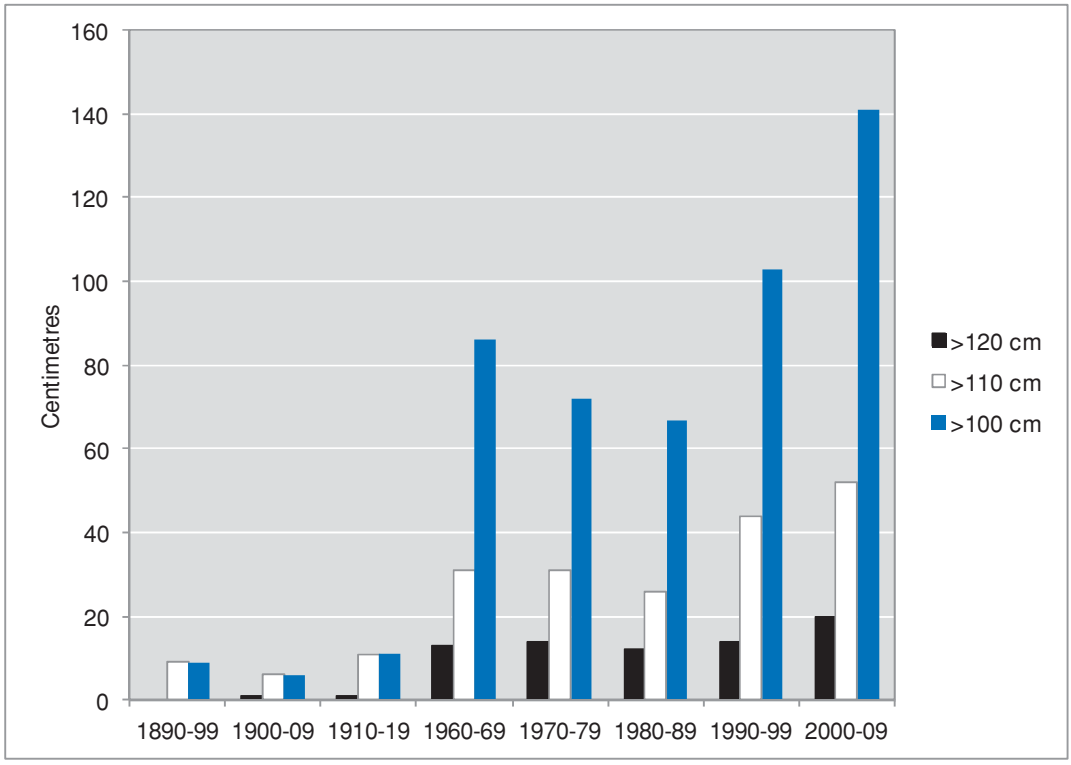
Note: * This is chaired by the President of the Council of Ministers, and participants include bodies and institutions with competence in the field of safeguarding Venice (an issue of "remarkable national interest" according to Special Law 171/73).

Source: Ministry of Infrastructure and Transport of Italy *et al.* (2010), "MOSE system-mobile barriers at the inlets", *www.salve.it/uk/soluzioni/acque/f_avanzamento.htm.*

Corrosion of stone, brickwork and iron caused by rising water levels compromises the building fabric in historic Venice. Most buildings in Venice rest on wooden pile foundations that are anchored in the underlying mud substrate, and above this, a base of Istrian stone (a form of dense almost impermeable limestone quarried from the eastern Adriatic) supports the brick and plaster walls that make up the rest of the construction. Plaster and bricks are particularly susceptible to corrosion, and accelerated decay occurs when salts crystallise with successive alternating wet and dry tidal cycles. Crumbling brickwork and plaster is not only evident near the water but also far up the sides of buildings, due to capillary action.

Extreme flooding in the Venice Lagoon is caused by climatic events with potentially widespread impacts across the entire city-region. Indeed, while Venice was under water in 1966, there was also dramatic flooding in the whole north-east of Italy. Along the coast, sea walls were destroyed by the raging waves, and beaches were washed away. Meanwhile, water that was pushed into the Lagoon by the stormage also travelled up into the mainland via the river mouths and breached the river banks (Rusconi, 2007). Whereas Venice suffered no loss of life, about 100 fatalities resulted on the mainland. Conversely, in the autumn of 2007, heavy rains caused flooding on the Venice mainland, but there was no *acqua alta* in the historic centre as this depends on different meteorological conditions.[37]

Figure 1.38. **Frequency of significant flooding for decades between 1880 and 1999**



Source: Battistin D. and P. Canestrelli (2006), *La serie storica delle maree a Venezia*, Istituzione Centro Previsioni e Segnalazioni Maree, Comune di Venezia, October, Venice; Istituzione Centro Previsioni e Segnalazioni Maree (2010), "Grafici e statistiche", Comune di Venezia, Venice.

In recent decades, erosion of remaining salt marshes and inter-tidal areas has been accelerating, due to stronger currents in the deep navigation channels and greater wave energy produced by wind acting upon deeper water bodies, which compromises the ecological resilience of the Venice city-region.[38] The salt marsh cover is one-third of what it was approximately 100 years ago,[39] and the volume of water contained in the Lagoon has practically doubled, as the morphological sub-structures have been washed away by erosion and the Lagoon bottom has deepened. This has created the conditions for a type of vicious circle feedback loop, further reducing the salt marshes' ability to react to environmental stresses and natural regenerative capability (Bonometto, 2003). The consequences are significant on available habitats, and thus in reduced biodiversity and reduced effectiveness of the natural water treatment processes offered by the Lagoon ecology. Hydrological security is also compromised, and flooding of human settlements within the Lagoon (Venice's historic centre and the other islands) more frequent. Moreover, land reclamation and the closing off of peripheral areas of the Lagoon have left a smaller area over which the incoming waters can spread.

Figure 1.39. **Flooding in Venice**



Source: Photo taken by Michael G. Donovan, Urban Specialist, OECD, 2009.

Ships entering the Port of Venice have also been responsible for the erosion of the Lagoon and disappearing salt marshes. Waves generated by the passage of ships and tankers spread laterally across the shallows and mudflats bordering on the deep thoroughfare, resulting in re-suspension of sediment. Even without the planned dredging to increase the depth of the Malamocco-Marghera channel, the hulls of larger ships intensify the transverse currents and associated sediment re-suspension, which leads to erosion. Wave energy throughout the Lagoon, generated by wind and other boat traffic, is the principal cause of Lagoon erosion, which could exacerbate the already precarious ecological state of the Mediterranean's largest and most important wetlands. Significant consensus has developed among researchers that the main cause of morphological degradation lies in the effects of wave energy in the Lagoon basin, and the mobile barriers at the inlets cannot be expected to have any effect on this phenomenon, irrespective of how they are manoeuvred or managed (D'Alpaos, 2009; Molinaroli *et al*., 2008; Sarretta *et al.*, 2009).

Conclusion: towards a resilient and integrated metropolitan economy

In light of the critical transformations mentioned in this chapter, the Venice metropolitan region faces three challenges to its competitiveness, which constitute the *raison d'être* of the public policies outlined in forthcoming chapters. First, the Venice

city-region may be in need of an economic upgrade, given the increasing importance of services and ubiquitous foreign competition. The city-region could capitalise on the market trends towards a service-based economy in order to integrate the economically excluded (older workers, women and immigrants), elevate the level of skills, and foster innovation capacity. Second, given the benefits of agglomeration and densification for such a service-based economy, metropolitan integration must be made a first priority. To encourage a more synergistic metropolitan economy, a series of measures could be pursued, including the construction of a metropolitan transportation network, curtailment of urban sprawl and the cultivation of inter-firm linkages across the city-region. Third, given its environmental vulnerability and the fact that 75% of Venice province is below mean sea level, economic policies should apply a "climate lens". Vulnerability to climate change, erosion, sea level rise (eustasy), rising temperatures and water pollution all suggest that an environmentally blind model cannot be sustainable in the long-term.

This Review will argue that confronting these challenges requires co-ordinated metropolitan governance. Though several projects have increased mobility in the city region, infrastructure alone will not resolve these challenges. The city-region could benefit from a less fragmented governance system with a more robust capacity to effectively respond on the regional scale. Government programmes designed to enhance intra-urban and metropolitan connectivity likewise merit continued support.

Given the economic and environmental fragility of the Venice city-region, the concept of "resilience" provides a unifying concept that can underpin policy recommendations to improve its economic performance and liveability. The concept of resilience originated in the natural sciences, and has since been applied in the fields of psychology, engineering and ecological economics. At its core, resilience connotes successful adaptation, despite risk and adversity (Bruneau and Reinhorn, 2006). Resilience for both physical and social systems can be further defined as consisting of the following properties: robustness, redundancy, resourcefulness and rapidity:

- **Robustness:** strength, or the ability of systems to withstand a given level of stress or demand without suffering degradation or loss of function. The Venice city-region is under stress from the declining appeal of certain manufacturing sectors and the environmental impact of its model of sprawling industrial development.
- **Redundancy:** the extent to which substitutable systems exist that can satisfy functional requirements in the event of disruption, degradation or loss of functionality. The Venice city-region will need to develop a diverse economy which can withstand shifts in consumer demand.
- **Resourcefulness:** the capacity to identify problems, establish priorities and mobilise resources when conditions exist that threaten to disrupt some element. Resourcefulness can be further conceptualised in the Venice city-region as consisting of the ability to apply material (*i.e.*, monetary, physical, technological and informational) and human resources to meet established priorities and achieve goals; and
- **Rapidity:** the capacity to meet priorities and achieve goals in a timely manner in order to contain losses, recover functionality and avoid future disruption. The Venice-city region already benefits from a flexible system of small and medium-sized enterprises, an asset that is unusual among traditional metropolitan economies and could allow it to respond rapidly to changing economic trends.

Metropolitan resiliency would benefit from an integrated approach involving economic, environmental and governance contributions. In light of the recession and structural transformations in the global economy, the metropolitan economy could be strengthened by measures that make it resilient to adversity and able to respond rapidly to change. Improved environmental management at the metropolitan level has the potential to make the Venice city-region more able to adapt to the impact of climate change and to offer new opportunities for "green jobs". Finally, public intervention depends on a resourceful and resilient system of metropolitan governance, which can dedicate resources to these questions and confront them in systematic and co-ordinated ways.

Figure 1.40. **Resiliency applied to Venice's policy recommendations**



Notes

1. The Veneto Region defines visits (*presenze*) as tourists multiplied by the number of days they spend in a specific place. The Veneto Region also calculated that Veneto benefitted from 61.5 million visits in 2007.

2. Data are from Centro Studi CGIA Mestre (2002) and were cited in Bialasiewicz (2004).

3. For example, the relevant functional region for managing health and social care (*unità locale socio sanitaria*, ULSS) in the Venice city-region covers ten local authorities and differs from the functional region for agricultural freight logistics.

4. The OECD has developed a methodology to gather and analyse metropolitan data based on three criteria. The first is urban density: the population should exceed a critical value set at 150 people per square kilometre. Second, the region should represent a contained labour market, with a net commuting rate not exceeding 10% of the resident population. Third, the population of the central city must be at least 1 million and that of the whole metropolitan area at least 1.5 million people. The OECD database also includes a small number of cities of less than 1.5 million people that are important in their national context, whose population accounts for more than 20% of the national population. These include Auckland and Oslo (Luxembourg and Reykjavik have been omitted, since they are extreme cases that represent outliers in many of our rankings) (OECD, 2006a).

5. Alternative models include: *i*) a dense and continuous metropolitan model along European Corridor 5, with Venice as its centre, including the areas generated by the urban centres of Venice, Padova and Treviso, on one side, and Verona to the west; and *ii*) the Alpine foothill model that includes the cities of Treviso and Vicenza and runs from north of Vicenza east to Conegliano, composed of the towns along the Bassano-Castelfranco highway.

6. The fourth-largest urban settlement in the metropolitan area is the municipality of Chioggia (50 888 inhabitants) located to the south of Venice.

7. These include 13 schools: Agricultural Sciences, Economics, Pharmacy, Law, Engineering, Humanities, Medicine and Surgery, Veterinary Medicine, Psychology, Education, Mathematical, Physical and Natural Sciences, Political Sciences, and Statistical Sciences.

8. Local civil society formed the bedrock of a productive network built on small and medium-sized businesses. An example is the case of local banks, which offered credit to SMEs and advised them not only on local investment decisions, but on international investment.

9. These included Saplo (closed in 1994), Alumix (1995), Tencara (2003), Alutekna (2004) and Dow Chemical (2006).

10. According to ISTAT, in 2008, unemployment levels stood at 3.6%, 3.4%, and 3.5% for the provinces of Venice, Treviso and Padua, respectively.

11. Products include the *gallina bianca padovana* (a breed of hens), the *castraure* (a kind of artichoke), radishes from Chioggia and Treviso, and "Philippine clams". Surprisingly, the Veneto region is the main Italian producer of this mollusc and one of the world's main producers.

12. The metacluster is defined as a production cluster whose production chain is widespread throughout the regional territory, making it an important tool for the economics of the metropolitan region.

13. The procedure adopted by the national statistical office does not refer to the definitions provided in the various regional laws on clusters. Rather, it is based on statistical parameters used to identify the territorial concentration co-efficient (or localisation co-efficient), widely used to determine the economic importance of a specific production sector in a local economy within the context of the national economy. Moreover, ISTAT, in its census, uses cluster names based on their geographical location, not their production specialisation (as is the case in the regional law). Given these differences, only 7 of the 20 clusters identified pursuant to the regional law and mentioned in the list above are monitored by ISTAT in its censuses (the latest one dates back to 2001).

14. It is worth noting that, according to ISTAT, Veneto has a level of informal workers below the Italian average. In 2005, ISTAT counted 12 non-regular working units out of 100, while in Veneto, the figure stood at approximately 8.7 out of 100.

15. Workers retiring at age 65 can expect to receive the old-age pension for around 16.5 years in the case of men and for around 20.5 years in the case of women.

16. The old age dependency ratio is conventionally defined with respect to the population aged 15 to 64. However, in most OECD countries, teenagers aged 15 to 19 are more often than not still in school, and it was decided for the purpose of this report to exclude this group from the definition of the working-age population (OECD, 2004).

17. Many of the immigrants in Treviso are concentrated in the industrial districts of Asolo-Montebelluna, Coneglianese-Sinistra Piave and Opitergino.

18. The Migropolis estimate is based on the number of amnesty requests received by the municipality of Venice during the last amnesty in 2002, which totalled 9 471.

19. From 2005 to 2008, the female participation rate in Veneto grew from 54.7% to 55.5%.

20. In other words, this includes:

    i) Commercial internationalisation: local firms are not only able to sell abroad directly (export), but invest to create their own sales networks in the global markets to ensure a more stable presence abroad.

    ii) Manufacturing internationalisation: productive processes traditionally managed at the local level (local suppliers) are now also carried out by suppliers located in other countries. However, in contrast to large corporations, district SMEs do not only directly invest abroad (FDI) but utilise local networks of suppliers in foreign countries (Chiarvesio *et al.*, 2010).

21. The following universities in the Venice city-region were ranked in the Sole 24 ranking: University of Padua (12), IUAV University in Venice (19), Cà Foscari University of Venice (28). In the Censis-Repubblica ranking of Italian universities, the University of Padua ranked first place in the "mega-universities" category (more than 40 000 enrolled), Cà Foscari University of Venice scored eighth in the "medium-

sized universities" category (between 10 000 and 20 000 enrolled) and the IUAV University in Venice scored third in the "polytechnic" category.

22. Immigrants originate from many countries, but those from Morocco and Albania make up the largest communities area-wide; in the municipality of Venice, immigrants from Bangladesh and the Far East hold jobs in the ship construction industry. The area has welcomed refugees from the former Yugoslavia and has a system of support in place for asylees. One stream of immigrants is represented by those of Venetian descent, primarily from Argentina and Chile.

23. For age data see Municipality of Venice (2009), "Età media della popolazione residente del Comune di Venezia", *www.comune.venezia.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/4069*.

24. For 2002 data, see *www.comune.venezia.it/flex/cm/pages/ServeAttachment.php/L/IT/D/D.a20852dccf83b2b8cc8a/P/BLOB%3AID%3D3815* and for 2009 data, see *www.comune.venezia.it/flex/cm/pages/ServeAttachment.php/L/IT/D/b%252F4%252F2%252FD.a9838c87604783348f62/P/BLOB%3AID%3D33395*.

25. For additional material on transportation statistics in Veneto and Italy, see *http://forumcompetitivita.regione.veneto.it/modules/dms/file_retrieve.php?function=view&obj_id=18*.

26. The railway axis Lyon-Trieste-Divaca-Koper-Divaca-Ljubljana-Budapest to the Ukrainian border is an important east-west link crossing the Alps between Lyon and Turin and between Italy and Slovenia. Hungary, Slovenia, Italy and France are involved in the project. The axis is planned as a fundamental link in the European transport network that will be able to absorb part of the continuing growth of traffic flows between the south-east, central and south-west Europe. The Lyon-Turin section is the core section of this priority project, comprising the Lyon-Turin Base Tunnel and the access routes. The cross-border section between Trieste and Divaca, approved in 2008, is also an important element of this project. Notwithstanding the political commitment repeatedly expressed by the member states involved, the current situation on both of these cross-border sections could be improved.

    Work on the Lyon-Turin Base Tunnel is scheduled to start in 2011 and to be completed in 2023. An Italian decision on the alignment, together with clear financial commitments, will be needed to respect this schedule. The European Commission has reserved EUR 671.8 million for the works on the Base tunnel for the 2007-13 period. The Commission emphasised in its progress report of May 2008 that commitment by member countries and subsequent follow-up actions at EU and member countries' level are crucial to the timely realisation of PP6.

27. The railway axis Berlin-Verona/Milano-Bologna-Napoli-Messina-Palermo is a key north-south axis crossing the Alps along the Brenner Corridor. It touches upon three member countries, Germany, Austria and Italy, and will link up important urban areas in Germany and Italy. The München-Innsbruck-Bolzano-Triente-Verona section, the core section of this priority project, comprises the cross-border Brenner Base Tunnel (BBT) and the northern and the southern access routes. Under the 2007-13 TEN-T Multi-annual programme (MAP), an investment of EUR 903 million is anticipated for the Brenner Base Tunnel and both access routes. Work on the BBT is due to start in 2010 and be completed in 2022. Italy has put the Roma-Naples section into service and is investing heavily in the Milano-Bologna-Firenze sections,

which should be operational by 2009. The capacity bottleneck between Verona and Bologna was eliminated by the end of 2008.

28. These include: residents or *residenti* (*Dati Anagrafici*, 2008); users or *utenti* II case e "altro" (Comune di Venezia, Ufficio Statistica, *Una stima della popolazione presente nel Comune di Venezia - Anno 2004*); commuters or *pendolari* (ISTAT, *Censimento poplazione 2001*); tourists or *turisti* (*Ufficio statistica Comune Venezia 2007 per i pernottanti, stime COSES 2007 per gli escursionisti*); and university students or *universitari stanziali* (Co.Ca.I. *Gli alloggi universitari a Venezia,* 2005).

29. Venice is a city that owes its vast international popularity to its unique architecture, for which it was designated a UNESCO World Heritage site meeting six criteria out of the ten possible (including two for cultural features and four for cultural and environmental features). The ancient centre of Venice and its Lagoon are not the sole tourist attractions in the metropolitan area, which also features Palladian villas in the countryside and Padua's botanical gardens. The historical centre of Padua is of enormous artistic value, housing major works of religious significance, such as St. Anthony's Basilica and the Scrovegni Chapel, with its frescoes by Giotto. There are also smaller centres of significance, which once held fundamental political or administrative functions in the area. Chioggia, for example, was one of the main ports of the Upper Adriatic and has often been described as a "little Venice".

30. A room in a four-star hotel in Padua costs approximately one-third of the price in Venice. The 40 kilometre distance can easily be covered by train or car in less than half an hour – the time it would take a tourist in Paris or Rome to reach the centre from a hotel on the outskirts (Russo, 2001).

31. The polycentric development followed the classic pattern identified by Kloosterman and Musterd (2001) according to which *i*) there are a number of historically and spatially distinct cities; *ii*) that are not clearly dominated by one city; *iii*) and do not differ significantly in size or overall economic importance; *iv*) located in more or less close proximity; and *v*) constituting independent political entities (cited in ESPON, 2001).

32. The most complete empirical work on sprawl *The Costs of Sprawl – 2000*, applied scenarios based on estimates of uncontrolled (sprawl) and more controlled growth for 15 economic areas in the United States. The result of five years of research, the study found that sprawl would result in USD 227 billion in additional costs in the United States over a 25-year period (Burchell *et al*., 2002). Controlled growth, it was found, could be achieved with only a 20% increase in density and a 10% increase in floor area ratio for non-residential uses.

33. The experience of brownfields redevelopment in the Arsenale area provides a similar example from historic Venice (Pastor, 2002).

34. The floods of 1966 are still vividly part of living memory. A violent storm surge inundated Venice, raising water levels nearly two metres above normal and leaving it without electricity for several days. The consequent damage included severe leakage from the oil cisterns used for heating systems, the strewing of rubbish and rubble throughout the city and the flooding of homes, schools, storerooms and offices.

35. In terms of its complexity and richness, it can be compared to other areas already recognised by the international community and specifically protected by the Ramsar Convention on Wetlands (Smart and Vinals, 2004). There are 51 Ramsar sites in Italy, totalling over 60 000 hectares.

36. An extreme event is defined as water levels above 140 centimetres (relative to the historic tide gauge zero), an exceptional event as 110 centimetres above the same reference level. Some restricted areas of Venice start flooding when water level rises above 80 centimetres, notably the San Marco Basilica. More widespread flooding occurs above 100 centimetres, given that major infrastructural investment since the mid-1990s has involved raising ground levels of public walkways, where possible, to at least 100 centimetres, and buildings are increasingly protected with tanking systems (Insula, 2000).

37. Ten per cent of the flow can be directed either into the Lagoon or into the sea via the Brenta river network (Rusconi, 2007).

38. Erosion has been an issue since the natural sediment supply to the Lagoon was effectively severed centuries ago when the main rivers were diverted away from feeding into the Lagoon to prevent silt build-up and the attendant obstruction of Venice's position as a pre-eminent maritime power.

39. Today only 33 square kilometres remain of the original 115 square kilometres of *barene*, the Venetian term for the salt marshes characterised by a unique ecology, a range of endemic species and vital inter-relationships with aquatic fauna and flora. The best-preserved *barene* are in the northern Lagoon, while the central and southern areas have been severely affected.

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Chapter 2

Towards a competitive city-region

The economic potency of the Venice city-region derives from its unique combination of unusually strong local communities and an outward-looking, export-oriented economic system. The industrial district model has been highly adaptive and this chapter recommends that policy makers confront three cardinal challenges by capitalising on the city-region's entrepreneurism, flexibility and cosmopolitanism. First, competitiveness could be bolstered by a regional innovation system, which could improve the relative weakness of science-based technological innovation in the tradable manufacturing sector. A specific approach towards SMEs is required, given their predominance in the Venice city-region's economy. Acquiring business development tools and strengthening trade associations through business development services would better position SMEs to connect with university departments, private companies, suppliers and their clients. Second, Venice city-region needs to introduce new skills into its labour market and achieve improved labour market integration for designated groups, such as women and older workers, i.e., those in the 55-64 age bracket. Policies to upgrade and adapt the skills of the labour force are critically assessed along with their ability to create inclusive labour markets, especially for immigrants, women and the oldest segment of the working population. Third, more initiatives would enhance connectivity between Padua, Treviso and Venice to ensure the dynamism of the city-region as an organic and synergistic whole. Connecting Venice to the outside by improving rail-port connections and curbing sprawl from the inside through promoting denser urban development merit prioritisation in a metropolitan economic strategy.

2.1. Towards a strategic vision for a metropolitan area

The Venice city-region has a long history of repeatedly re-inventing itself economically by relying on its traditions of high quality and craftsmanship; it now needs to find new ways of continuing this trajectory. This adaptability can be traced back to the late medieval period, when the glass makers of Murano responded to the challenge of cheaper products from Bohemia, and it has been seen again since the 1990s in the Veneto's emergence as one of the regions in Italy most successful in responding to new challenges from Central and Eastern Europe, and also from China and the Far East. As the Venice city-region confronts the latest transformational economic trends, the central question is how it can build on its past success and gain consensus on promoting a new culture of innovation, entrepreneurism and collaboration competitive in the twenty-first century.

The economic potency of the Venice city-region derives from its unique combination of unusually strong local communities and an outward-looking, export-oriented economic system. As noted in the previous chapter, the industrial district model has been highly adaptive, making use of mergers to establish some larger firms and relocating parts of the production chain to other parts of the world, but retaining the essentially local character of its enterprises. Entrepreneurs of the Veneto have learned quickly to adapt production methods and marketing opportunities to global challenges. For example, the development of certain leading large firms within the usually SME-based concept of the industrial district has facilitated its industrial districts' entry into global markets (Amighini and Rabellotti, 2005; Burroni, 2007). Its firms also incorporate a diversity of organisational forms, gradually shifting from small to medium-sized (Burroni, 2007). Flexibility and agility are key characteristics of this regional economy.

Capitalising on its entrepreneurism, flexibility and cosmopolitanism, the Venice city-region needs to retune its economic policy instruments to confront three cardinal challenges. First, competitiveness could be bolstered by a regional innovation system, which could improve the relative weakness of science-based technological innovation in the tradable manufacturing sector. Despite promising initiatives, the Venice city-region has struggled to compete with the science-based regional innovation systems of, for example, the Nordic countries. Nevertheless, low levels of FDI and the cumbersome procedures required to form businesses compromise the region's competitive position. If current plans to develop new fields of activity in nanotechnology, life sciences and logistics are to succeed, new sources of capital and more rapid formation of new firms will be necessary. This has special relevance for Padua, given the size of its university. Improving engagement between the regional economy and research institutes, especially in Padua, also entails improving the scientific and technological competence of the workforce.

Second, the Venice city-region needs to introduce new skills into its labour market and achieve improved labour market integration for designated groups, such as women and older workers, *i.e.* those in the 55-64 age bracket. As outlined in Chapter 1, the Venice city-region's labour force, only 9.5% of which has a tertiary education, ranks as having one of the lowest levels of tertiary education among OECD metro regions. Though Venice city-region's highly skilled artisans have been able to transcend this limitation, there is concern that the next era of innovation will require a more technical education. Equally important, the shift from SMEs to middle-sized companies may curtail workers' opportunities for developing skills on the job. High inter-generational turn-over

and the closure of many vocational institutes calls into question the long-term sustainability of the older "Third Italy" model at a time when many women and those in the 55-64 age bracket have become economically inactive. In 2008, 47.3% of older workers were economically active in Italy, compared to the OECD average of 61.7%. The disparity is even wider for women in Italy, 34.8% of whom are active, which falls behind the OECD average of 52.3% (OECD, 2009b).

Third, more initiatives would enhance connectivity between Padua, Treviso and Venice to ensure the dynamism of the city-region as an organic and synergistic whole. Governments in the Venice city-region have long been concerned with improving regional interactivity, as evident in a series of bold rail and roadway projects. Infrastructure improvements, however, can only provide part of the solution, and incorporating new regional approaches to tourism, inter-firm linkages, public transportation, cultural policy and housing markets are called for.

2.2. Addressing the economic base in the context of a new regional economic scenario

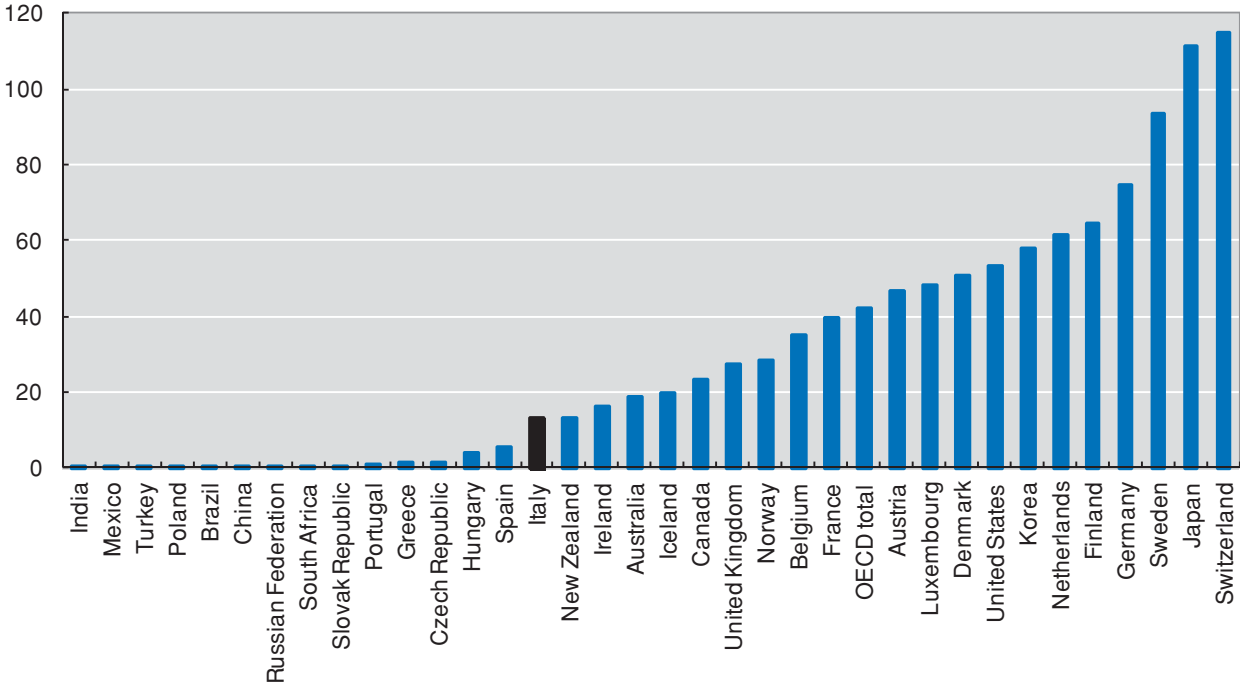
Improving the regional innovation system

Policy makers in the Venice city-region have acknowledged the need for a wider model of innovation. As noted in Chapter 1, the city-region is hindered by low levels of R&D spending and patenting. In response, policy makers have become concerned that the traditional focus on manufacturing is a potential weakness that leaves the region exposed economically. Augmenting the "sunrise" innovative clusters in the Veneto with new sectors and industries has become an increasingly pressing objective. In 2008, Veneto's regional government announced a change in the direction of enterprise policy towards the creation of new high-technology sectors and firms, drawing on the region's existing technological assets.[1] This was intended as part of a wider regional cultural shift from a branch-plant economy of employees towards a dynamic, knowledge-based economy. This confirms recent OECD reports on innovation (2008, 2009) that reveal how investment in knowledge and intellectual assets is key to value creation.

While the capacity of the region's firms to innovate has not been in doubt, their use of applied science and technology has been more problematic. Despite its dynamism, the Veneto does not rank particularly highly among Italy's regions for scientific innovation. As illustrated in Chapter 1, traditional indicators of innovative activity such as high-technology entrepreneurism, patenting and R&D expenditure are low in both international and national terms, and Italy itself does not rate well in comparison with other advanced countries in terms of the business application of science-based innovation (Figure 2.1).[2] Veneto lags behind other regions in R&D expenditure, with only 0.72% of its GDP dedicated to R&D, compared to a EU15 average of 1.83% and the Italian average of 1.12% in 2006 (Regione del Veneto, 2009e). While the overall levels are still comparatively low, Veneto has made significant progress in devoting resources to R&D. For instance, the amount of R&D investment from 2003 to 2007 doubled, growing from EUR 365.4 million to EUR 731.0 million. Within the 2006 Gross Domestic Research and Development Expenditure 54% of the R&D funds came from the business enterprise sector and 33% from the university system, leaving the government to provide only 10% and the private non-profit sector 3% (ISTAT, 2008). Figure 2.2 clearly shows that many regional governments in Italy, such as Lazio and Piedmont, are much more active in sponsoring R&D.

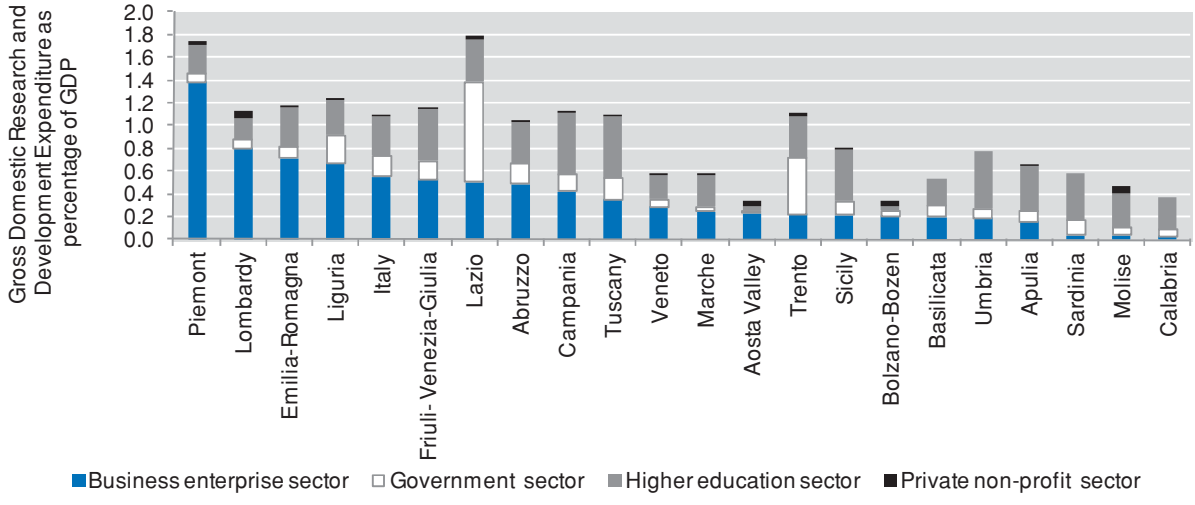
Figure 2.1. **Patents registered in the European Patent Office, the Japan Patent Office and the United States Patent and Trademark Office, 2006**

Number per million inhabitants, 2006



Source: OECD (2009), *OECD Factbook*, OECD Publishing, Paris.

Figure 2.2. **R&D intensity in Italy across four sectors**



Source: OECD Regional Database, 2005, internal database.

The expansion of the innovation system is constrained by a lack of venture capital funding in the Veneto that may seem to contrast with its economic and entrepreneurial standing. However, the reasons for this shortage are well known to business managers and can be summarised in the following three key points:

- **The financial limits of family-run SMEs.** Veneto businesses are typically family-centric and are often perceived as an extension of the entrepreneur's identity (indeed, many businesses are named after their owner). The companies are often small and spread all over the territory, which has led to a business model that leaves the family as the main source of seed capital for new enterprises. This has constrained the development of skills and inhibited growth. Many start-ups lack skills to develop a business model and a business plan, and many candidates are not prepared to present their entrepreneurial idea to potential investors in order to find an interested sponsor. Furthermore, many SMEs are struggling to access credit, given the recent mergers in Italian savings banks, which reduced the possibilities of building personal relationships with local bank branch managers. The effects of these changes, however, have been less acute for SMEs engaged in innovation processes where a "cluster investment" can be split into a large number of small shares.[3]

- **Limited access to the stock market.** Recourse to the stock market and its company structures by start-ups is rather limited, which tends to deter investors. Too often, rather than being targeted at global markets with solid growth potential world-wide, new ideas are relegated to small regional and national markets and hence have limited potential (Colomban, 2009).

- **Low foreign direct investment.** Although the analysis of exports shows positive data for the metropolitan area's economic system, foreign investments are still relatively low. Companies that are partly owned by foreign companies are still few and far between, and only 0.5% of direct investments in Italy from abroad concentrate on the metropolitan area. Low FDI is probably related to Veneto's high adjudicatory backlog. An analysis of the administrative caseload of Veneto shows that, at the end of 2005, approximately 2 000 appeals in the area of trade, industry and crafts were pending before the regional administrative court (comprised of 15 judges and divided into three sections), and that some of these cases dated back more than 10 years (OECD, 2007b).

Momentum has been building for improved provision of early-stage financing to promising companies in need of capital. For example, the Confidi Veneto collective helps commercial, tourist and service firms obtain access to credit and the "Italian Angels for Growth" non-profit association pools the venture capital of entrepreneurs from central and northern Italy to invest in the early development stages of certain companies.[4] Nevertheless, further efforts are needed to improve the state of venture capital in Veneto and in Italy, where levels are low compared to other OECD countries (OECD, 2009b). Resolving this depends on action by sub-national and central governments in taking measures that will make involvement in Italian firms more attractive to venture capitalists and other investors.

Like Veneto, Italy has under-performed in creating structured relationships between innovative firms, local universities and other research centres. There is usually little in Italian industrial districts to compare with the science-based regional innovation systems of, for example, the Nordic countries. This can often be attributed to the reluctance or inability of SMEs to develop relations with scientific research and of Italian university

professors to engage in applied work and relationships with firms. At the national level, too, Italy does not yet have an extended commitment to providing the finance and organisational structures necessary for a world-class system of applied technology. The country ranks the eighth-lowest in OECD rankings for both public and private per capita R&D expenditure and numbers of researchers per 1 000 of population (OECD, 2009b). Italian universities also suffer from organisational problems, a failure to provide meritocratic career routes for talented young researchers, and a lack of integration in international scientific networks (Box 2.1).

Box 2.1. **The challenges of Italian universities**

In most countries, a significant amount of R&D effort occurs in universities or research institutions that are part of the tertiary education sector. In Italy, this sector is underdeveloped; indeed, it has been a concern for some time that Italy suffers a net loss of young graduates through emigration and that few foreign researchers appear to be interested in working in Italy. In 2005, a decree authorised the Ministry of Higher Education to subsidise universities that wished to recruit researchers or professors from abroad, either foreign citizens or Italians who had worked abroad as researchers or in university education for several years; this programme has now ended, and it is not clear whether it had any permanent effect. Foreigners can also sometimes face obstacles to coming to work in Italy; for example, the procedure for recognising foreign university qualifications can be cumbersome.

Although Italian policy makers have tried to encourage the modernisation of academia, the existing regulatory framework guiding the institutions provides only modest incentives for universities to be more outward-looking. For example, the criteria for faculty promotion do not reward interaction with the private sector, and are heavily biased towards traditional incentives (*i.e.* publication in scientific journals). Likewise, the regulatory framework does not encourage researchers to set up partnerships with private enterprise, under-utilising the potential for spin-offs associated with university-business linkages. The recent Law N. 230 of 4 November 2005 (the "Moratti Law") has attempted to build links between the private sector and universities, allowed universities to establish partnerships with a private corporation for a maximum of six years. These funds can also be used for hiring professors for a renewable period of three years.

Source: OECD (2009), *OECD Economic Surveys: Italy*, OECD Publishing, Paris.

As the Venice city-region incubates new innovative sectors and upgrades its research capacity, collaborative partnerships will be vital. The challenge for the Venice city-region is not a structural one, but more subtle – changing the way the region approaches the business of innovation, within firms, within research institutions and through collaborative partnerships. With this in mind, two sub-systems of the regional innovation system (RIS) need to be fostered: knowledge-generation and knowledge exploitation sub-systems. According to Cooke and Piccaluga (2004), knowledge-generators produce new knowledge within networks of corporate, academic and public research activity that inevitably extend beyond a single region. Simultaneously, knowledge utilisers exploit that knowledge by creating competitive advantage in global production networks and creating new competitive products that can be profitably traded. Intermediary organisations and regulatory institutions in the Venice city-region can facilitate relationships between these sub-systems through a number of different institutional forms, including:

- **Bridging the "gap".** Many "model" regional innovation institutions build relationships and position themselves between the two sub-systems to valorise knowledge.
- **Subsidising experimental interactions.** Innovation support organisations can also intervene by providing subsidies for experimental interactions between the two sectors, such as university technology transfer offices or innovation voucher schemes (Box 2.2).
- **Mobilising collective demand.** These institutions work with existing and new firm networks to identify common knowledge needs; many clustering organisations play this role.
- **Direct brokerage.** These centres have knowledge of local firms and universities and link the two on a case-by-case basis. Knowledge House in the northeast of England is a university-supported service helping firms to access university knowledge (OECD, 2009c).

Box 2.2. **Innovation voucher programmes for small and medium-sized enterprises**

Innovation vouchers are a common tool used to support SMEs that already have an idea of a business problem for which an innovation can be a solution. In addition to helping the SME solve a problem, such programmes are also designed to support links with nearby institutions, including universities and research centres. They are used at the national level in several countries, such as in Ireland (EUR 5 000) and the Netherlands. A study of the innovation voucher in the Netherlands showed that eight out of ten projects would not have been conducted without the voucher, and that the voucher stimulated new links between firms and research institutions (Cornet, 2006). In the United Kingdom, the north-west of England has such a programme with two tiers, a first tier with a voucher of GBP 3 000, and a second tier, if matched with GBP 3 000 from the firm, of GBP 7 000. Within Spain, the region of Valencia has recently launched a *Cheque Innovación*.

Source: OECD (2010), *OECD Reviews of Regional Innovation: Catalonia, Spain*, OECD Publishing, Paris.

Connecting businesses in the Venice city-region to cluster and value chain structures will also be critical to improving innovation knowledge creation, particularly among SMEs. Small and medium-sized enterprises embed themselves in technical and cultural environments that provide them with technology frameworks and quality standards. Knowledge producers and utilisers cannot recognise each other if these social and cognitive structures are not available. SMEs can benefit from "scaffolding structures". As Lane and Maxfield (2005) argue:

> *Scaffolding structures provide a framework for controlling the kinds of new entities – both agents and artefacts – that enter the market system, and for aligning the attributions of agents in the market system about one another and the artefacts they make, exchange, install, maintain and use. Through scaffolding structures, agents can consolidate a zone of agent-artefact space, making it sufficiently stable to support both markets and the generation of new artefacts to be traded within those markets.*[5]

Acquiring business development tools and strengthening trade associations through scaffolding structures would better position SMEs to connect with university departments, private companies, suppliers and their clients. Such broad, powerful associations would help create market systems that might induce more innovation. That is, rather than provide technical assistance and financial support for patented components of innovative "green buildings", policy makers might help create a market system for green buildings or sustainability certification procedures. This kind of investment has the potential to create the environment for aligning technology demand and supply.

A supportive national framework for innovation

National decisions in the field of research play a strongly influential role in the evolving regional innovation system in the Venice city-region, given that the Italian government has sole competence for activities in the field of basic research. The national government also has an interest in innovation policy through the valorisation and exploitation of these investments in knowledge capital. There have been three main strands in Italian national innovation policy in recent years (OECD, 2009c):

1. **Systematic and strategic investments.** The government has sought to increase traditionally low levels of investment in R&D in a focused and responsible manner. The novelty of these kinds of investment has led to the adoption of national strategies for R&D policy, which aim to ensure that investments are co-ordinated and directed towards addressing poor national R&D performance. These have been spearheaded by the Italian Ministry of Science, Research and Arts and the Ministry of Education, Universities and Research (MIUR).
2. **Selection of key priority areas.** Much emphasis has been placed on identifying the priority sectors towards which innovation funding will be selectively directed, as well as new instruments to help build critical mass and global strength in emerging strategic areas, sectors and poles. These key sectors are required to have the capacity to drive transformation and modernisation throughout the Italian economy.
3. **Promoting interaction between innovators.** Innovation in Italy has principally been driven by SMEs with relatively few connections to universities, research centres and the banking system. The government aims to stimulate partnerships between knowledge generators and knowledge exploiters, along with those who can help with interaction, knowledge transfer and strategic co-ordination between sectors.

Building on these pillars, the Italian government formulated a reform programme in 2005 to incubate innovative clusters, including the Veneto's nanotechnology cluster. The National Research Plan is a high-level governmental strategy document that complements both the national reform programme and the *Industria 2015* plan for economic development. The National Research Plan, running from 2005 to 2007, aimed to reinforce the scientific base of the country and strengthen the technological level of the Italian productive system by identifying particular strategic industrial research programmes. Technology districts in key sectors were promoted jointly by the government and the regions, as territorial entities systematically grouped and characterised by technology-intensive products and services (OECD, 2009c). The Veneto's nanotechnology sector benefitted from being designated one of the 25 technology districts in Italy.[6]

After a series of constitutional reforms, the Italian government empowered regional governments, such as that of the Veneto, to implement innovation policy. The first step in this respect was the legislative Decree No. 112 of 31 March, 1998, which delegated specific responsibilities to the regions over the design and implementation of industrial and technological policies.[7] Two important constitutional articles, ratified subsequently, suddenly made a serious regional innovation policy possible in Italy, by devolving the competencies for innovation and the resources to implement them in Articles 117 and 119.[8]

Innovation policy actors in the Venice city-region

A variety of programmes, involving both the private and the public sector, have been created since 2005 to promote scientifically linked innovation and facilitate access to credit. This has been achieved, in part, by actively encouraging existing firms, laboratories, research groups and universities to support new businesses. A key reference is Veneto Innovazione, a public limited and non-profit company, which co-ordinates projects in the spheres of research, innovation and services to business and brings together small and medium industries to work on specific transfers of technology, know-how and expertise. Others include Galileo Science Park, VEGA Science Park and Veneto Nanotech.[9] The Venice city-region is endowed with a vibrant knowledge-generation system which includes private research foundations, universities and 118 technical institutes.[10] All of these could be better connected to accelerate university-linked technological innovation.

The Veneto Region has begun to stress innovation and the knowledge economy through a wide range of ventures, including Veneto Sviluppo and Veneto Nanotech. Veneto Sviluppo is a regional public limited company that grants small and medium-sized industries medium-term loans and risk capital transactions. Veneto Nanotech is a regional company intended to promote international excellence in research, helping to apply nanotechnologies and develop new business in this sector.[11]

The Veneto has been effective in securing support from the European Union to fund the launching of its new regional innovation system. Veneto's programmes benefit from the support of the Regional Policy Directorate (DG XVI) of the European Commission, which reinforces the increasing importance of innovation policy as a central component of European regional policy. Veneto, as with the majority of regions in Italy, has expressed its commitment to the Lisbon Agenda, which was ratified by the Italian Parliament in July 2008 and commits to making Europe "the most dynamic and competitive knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion and respect for the environment by 2010". Specifically, the Lisbon Agenda sets a target for every European region to invest 3% of its GDP in R&D by the year 2010. This priority will promote business innovation in the knowledge-based, product development and process development sectors (including new start-ups). It will also support R&D, networking, aid for new innovation business creation (mainly among young women) and services to enterprises and support for financial engineering instruments (Box 2.3). Not only has the Veneto Region been effective with its relations with the EU, but it has prioritised innovation, targeting 42% of total EU funding to innovation-related initiatives. This extends the involvement of the EU in the region, which was previously limited to funding policies to ease structural change, such as the clean-up and redevelopment of

Port Marghera, the construction of the new port of Chioggia and the redevelopment of Murano Island.[12]

Box 2.3. **European Union-sponsored regional innovation projects in Veneto**

Venice Gateway – VEGA Science and Technology Park

The environmental upgrading of the Port Marghera area in Venice has been substantially supported by the European Regional Development Fund (ERDF) since the early 1990s. The Scientific and Technological Park, called the Venice Gateway – VEGA, has been developed on this site, promoting economic activities that have little or no effect on the environment, especially in areas with abandoned or heavily degraded industrial sites. VEGA provides assistance to companies wishing to develop innovative sectors, especially computer science and multimedia services. Additionally, a Business Innovation Centre has been set up to provide managerial services for companies, covering an area of some 16 000 square metres and including glass-making and computer workshops, and precision instruments and calibration facilities (*www.vegapark.ve.it*). The site is located in a declining industrial area of Mestre, taking advantage of existing infrastructure, and provides a reference for both innovation incubation and brownfields redevelopment in the Venice city-region.

Nanotechnology Fabrication Facility (NanoFab)

The Nanotechnology Fabrication Facility is a project of the Veneto Region, which benefits from the EU Commission's *Regions for Economic Change* initiative. Inspired by the Penn State Nanofabrication facility, it is one of the first Italian laboratories devoted to the transfer of nanotechnologies to industrial production. It was created with an investment of over EUR 25.5 million, co-financed by the ERDF (EUR 4.6 million), the Italian government (EUR 16.3 million), the Veneto Region (EUR 1 million), VEGA, Venice's science and technology park (EUR 2.4 million), and other private funds (EUR 1.2 million). NanoFab seeks to transfer technological knowledge and the results of industrial research to firms, especially local companies involved in heavy industry, *e.g.* the petrochemical industry, which may benefit from the application of nanotechnology. Today, NanoFab is also applying nanotechnology solutions in the Venice city-region's established textile and leather industry (*www.nanofab.it*).

The partnership that provides the foundation for NanoFab is a consortium composed of VEGA, Veneto Nanotech (a "technological district") and the InterUniversity Co-ordination for Nanotechnologies (CIVEN) association of Veneto universities working in nanotechnology. There is a clear division of roles among these partners: Veneto Nanotech promotes NanoFab activities and research outcomes of the "nanotechnology district", CIVEN provides training courses for managers and staff, designs projects and carries out applied research relevant to industrial needs, and VEGA provided the nanofabrication facility with initial resources and infrastructure. Such a partnership allows NanoFab to respond to specific and complex demands: companies may commission R&D projects, draw upon the scientific and technological know-how of qualified researchers and use the centre's equipment. During its first year (2006), the facility participated in approximately 40 projects designed by regional companies and participated in three projects submitted to the Seventh EU Research Framework Programme in 2007.

Source: *www.vegapark.ve.it* and *www.nanofab.it.*

The substantial funds approved by the European Commission for the period 2007-2013 offer the Veneto a privileged opportunity to develop its renewable energy and green infrastructure initiatives, which need to be expanded to improve regional competitiveness. The operational programme aims to create at least 800 new full-time

jobs in industry and the R&D sector, to increase the consumption of renewable energy by 25% by 2015 and to reduce greenhouse gas emissions. With a total budget of around EUR 452 million, the Veneto Region's operational programme is the third-largest in Italy and the sixth-largest for the European Regional Development. The programme anticipates that these efforts will substantially contribute to the achievement of the Lisbon Strategy objectives, given that 63.7% of the funds are specifically earmarked for these objectives.

Bridging the gap: connecting the innovation community

Innovation could be better supported through the promotion of industrial liaison programmes and "triple helix" organisations. These bridging institutions consist of hybrid public-private research laboratories involved in their own commercialisation activity, or specific programmes that subsidise experimental interactions, such as public programmes that encourage movement of personnel between university and business laboratories (OECD, 2009b). Perkmann and Walsh (2008) find that research partnerships between firms and universities have the highest impact on knowledge spillovers. Throughout the OECD, an increasingly strategic role is being played by networked, "wall-less" institutions that promote territorial pooling of qualified labour, and stimulate local innovation hubs that are inserted into the global economy.[13] Such programmes generate spin-offs and attract capital for research activities, as has been shown in universities world-wide.[14] Though the Venice university community announced that it would favour the creation of such networks rather than the creation of a new technical university (the *Politecnico*)[15], a robust network has not yet emerged. The Venice city-region would do well to follow the example of other OECD regions, such as the Georgia Research Alliance[16] and Helsinki's triple helix model (Box 2.4), to define a new regional innovation system that will facilitate the flow of knowledge throughout the entire production framework.

A higher degree of co-ordination in the innovation community could produce the relational capital level among businesses, entrepreneurs, researchers and governments to facilitate innovation. International best practices on managing the linkages between university and business show the growing importance of streamlining the regulatory framework conditions surrounding the interface between university and enterprise, creating incentives for university professors to interface with the private sector (OECD, 2009b).

To increase synergies between the public sector, the private sector and universities, policy makers could consider adopting the triple-helix networks models developed in several OECD metropolitan areas. Within these networks, business, public authorities and research institutes collaborate on innovation and the commercialisation of public research. Several examples of such networks are in place in Copenhagen, for instance. The Capital Region of Denmark, which roughly includes greater Copenhagen, is engaged in strategic co-operation with the University of Copenhagen and the Danish Technical University in the development of business incubators. The triple helix co-operation in Copenhagen has extended to strategic policy formulation through its Regional Business Development Strategy, entitled "Partnerships for Development of Knowledge, Growth and Welfare" (OECD, 2009d).[17] Helsinki offers another example of a triple-helix model in its collaborative efforts between public authorities, universities, polytechnics, science parks and the business community (OECD, 2006b). The model pursued by the Chicagoland Chamber of Commerce reinforces the need to engage in collaborative approaches involving public-private coalitions to spur innovation (Box 2.5).

Box 2.4. **A successful "triple-helix" model: the example of the Helsinki Culminatum Ltd.**

For 15 years, the City and University of Helsinki have built up their co-operation, the most important ingredients of which are: promoting science-driven business enterprises with the aid of a common business incubator and science park, co-operating in urban and traffic planning to develop campuses and transport and logistics between campuses, creating a common Student City concept to increase the city's international appeal, promoting urban research by creating six (now nine) professorships in urban research, and collaborating with the city's own think tank, Helsinki City Urban Facts.

Besides their international co-operation, the University and City of Helsinki have been initiators in establishing the Helsinki Region Centre of Expertise Culminatum Ltd. This public-private organisation is based on the "triple helix" model, which means that one-third of its shares are owned by the local universities and research institutes, one-third by the City of Helsinki, its neighbouring municipalities and the Uusimaa Regional Council, and one-third by the business community, financers and science park companies.

Helsinki Culminatum, which forms a co-operation forum and a basis for the development of common projects, focuses on two missions, namely:

i) **Managing regional cluster-building activities in six selected sectors of the knowledge-based economy.** Development programmes and actions are funded mainly by the cities and by national innovation organisations. In sharing their knowledge, universities and polytechnics play a crucial catalysing role in development projects. One of the focus areas of Culminatum is to help university spin-off companies grow. Cluster-building activities by Culminatum combined with the funding from the National Technology Agency (Tekes) have contributed to increased interaction between SMEs and higher educational institutions.

ii) **Developing the Helsinki region as a world-class innovation ecosystem – the so-called Ideopolis.** Early 2005 saw the creation of *Yhdessä Huipulle* (Together to the Summit), a common innovation strategy by Culminatum's owners, presenting 26 development collaborations between the universities, cities and the business community on four key issues: *i*) to increase the international appeal of local research and education, *ii*) to develop strong clusters and create test beds and living labs for product-service development, *iii*) to apply innovations to renew the welfare services provided by the cities and to consolidate the role of the cities in the R&D, and *iv*) to support university-driven business growth by, for example, developing a second-generation science park concept.

Source: OECD (2006), *OECD Territorial Reviews: Stockholm: Sweden*, OECD Publishing, Paris.

The relative absence of "bridging" institutions that mediate between universities and research institutes – both public and private – is not conducive to the development of an innovative regional system. The rich knowledge economy is relatively disconnected from industry in the Venice city-region; Venetian universities are just beginning to form research agreements with industries, since this was permitted only after the passage of the Moratti Law (2005). To date, there are only a few collaborative initiatives bringing

Box 2.5. **InnovateNow: the Chicagoland collaborative model**

The **InnovateNow** initiative is premised on the assumption that purposeful action designed to create a culture of collaboration, build strategic alliances and fully leverage regional innovation assets will result in a competitive advantage in the twenty-first century global economy. It further assumes that firms embracing collaboration and placing value on tapping into and exploiting internal as well as external ideas, resources and channels will be more successful than those firms that do not. It recognises that the traditional inward-focused vertical integration business model is no longer sufficient to compete and win. InnovateNow further recognises that public policy and NGOs can play a role in promoting and providing incentives to encourage collaboration and overcome the limitations of traditional approaches and roles. Fostering such collaboration between public agencies, academia, nonprofits and industry is a key goal for InnovateNow, as indicated in the examples below.

The Innovation Summit: This unique collaboration among business, academia and the public and non-profit sectors was created in 2005 to create a new model for economic development in the new global economy. The Innovation Summit is held annually and convenes the world's best innovation and entrepreneurial experts to highlight best practices and the role innovation can play in transforming Chicagoland into a globally recognised centre of innovation, entrepreneurism and creativity. Presenting partners of the Innovation Summit include an array of public/private organisations drawn from three states and the District of Columbia.

Illinois Innovation Talent Pilot: This collaborative effort seeks to prepare students to become leaders in the global economy by promoting multidisciplinary problem-solving. InnovateNow, in partnership with the Illinois Department of Commerce and Economic Opportunity, assembled a public-private coalition to work with Illinois high schools to promote innovation-centred, problem-based learning. Through this partnership, teams of Illinois high schools are connected with industry, government and community partners to critically examine and solve complex problems as members of diverse, multi-disciplinary teams using leading-edge information technology. The pilot programme included 23 high school teams partnered with 29 professional organisations, including universities and community colleges from across the state.

Illinois Coalition for Manufacturing Innovation: InnovateNow, in partnership with the Illinois Institute of Technology (IIT) and Argonne National Laboratory, launched the Illinois Coalition for Manufacturing Innovation initiative to facilitate better collaboration around innovation and technology between the research and talent in universities and national laboratories and small and medium-sized enterprises. The objective of the initiative is to create and disseminate new models for engagement and collaboration to help small and medium-sized manufacturers more easily access the brainpower and innovation resources of research institutions.

Crowd sourcing and open innovation: To demonstrate the value of open innovation, InnovateNow posted a "challenge" on InnoCentive, a leading crowd-sourcing platform, to solicit ideas to help reduce greenhouse gas emissions from automobiles by increasing ridership on public transport. Through this platform, InnovateNow was able to tap into the unlimited resources and brainpower of over 170 000 minds from around the world on an issue of great significance to Chicagoland. Individuals as far away as Kenya, Australia and Japan had opinions and useful ideas about how Chicago could decrease automobile use and greenhouse gas emissions by boosting public transportation ridership. InnovateNow was the first organisation from a major metropolitan area in the United States to post a public policy-related challenge on InnoCentive.

Source: Chicagoland Chamber of Commerce (2009), *www.chicagolandchamber.org*.

together private research institutes, public agencies and universities. These include the development of nanotechnology clusters, *e.g.* the Veneto InterUniversity Co-ordination for Nanotechnologies (CIVEN)[18] and the public-private research network of Veneto's nanotech cluster.[19] The Venice city-region's innovation community could learn from the experience of the Stockholm Academic Forum, which brought together the vice-chancellors of Stockholm's universities in a network that promotes the region to international researchers and attracts foreign investments in research (OECD, 2006b). In the Venice city-region, similar joint strategic projects could be pursued in areas such as wood processing, metal and alloy production, agro-food processing, textiles and footwear.

Monitoring the regional innovation system

Government authorities in the Venice city-region, especially the Veneto Region, need to monitor the progress of the development of the regional innovation system. Studies of at least the Galileo and VEGA projects suggest that these do indeed have well defined built-in assessment systems, enabling good feedback on their achievements (Bigliardia *et al*., 2006). The Regional Commerce Observatory has the duty of monitoring the extent and the efficiency of the region's distribution network in collaboration with the municipalities, provinces and chambers of commerce. Their metrics could be improved through clearer measurement systems that could help track the achievements of the regional innovation system. These have been developed for the European Union and may provide a metric for benchmarking in the Venice city-region (Table 2.1).

Table 2.1. **Structured toolbox of policy measures currently implemented in the EU**

Objectives	Target groups	Policy measures
Improve innovation governance and strategic intelligence for policy making Strategic vision Innovation studies Innovation strategies Trans-national co-operation Policy learning	Policy makers, Regional stakeholders (firms, universities, research centres)	Strategic vision B1: New platform prospecting and feasibility B2: Platform incubators E6: Foresight Innovation studies and evaluations E7: Evaluation and benchmarking innovation strategies B1: New platform prospecting and feasibility Transnational co-operation A1: Attracting foreign researchers A6: Foreign teachers for doctoral courses
Foster an environment receptive to innovation Administrative simplification Regulatory environment State aid for innovative firms Information exchange via e-portals Boosting technology adoption	Enterprises, universities and (public) research institutes Public sector and administrative representatives Innovation agencies' employees	E1: European fund raising E11: Dissemination of scientific and technological culture Administrative simplification Regulatory environment State aid for innovative firms Information exchange, *e.g.* via e-portals E12: Research portal Boosting technology adoption

Table 2.1. **Structured toolbox of policy measures currently implemented in the EU** (*cont.*)

Objectives	Target groups	Policy measures
Higher education/human capital development/gender issues	Higher education institutions, research centres	A1 and A2: Attract foreign researchers and students A3: Research networks A4: Researchers abroad A5: Brain drain A6: Foreign teachers for doctoral courses A7: Doctoral programmes A8: Life-long learning A9: Tenders for the young A10: Visiting fees
Development of research infrastructure	Higher education institutions, public research institutions	
Strengthen innovation, including the protection and commercialisation of intellectual property Direct innovation support Innovation skills Non-technological innovation Intellectual property protection Research commercialisation Tax incentives Innovation management Financing of R&D and innovation	Enterprises	B5: Supply chain innovation D5: Demand pull tenders Direct innovation support Innovation skills Non-technological innovation Intellectual property protection E2: Alternative forms of protection for intellectual property E3: Patents fund E4: Patent registration vouchers Research commercialisation B3: Living labs Tax incentives Innovation management E10: Educational programmes for innovation managers Financing of R&D and innovation B4: Size increase
i) Strengthen innovation in the SME sector	Enterprises (SMEs) Public sector Banking/financial sector	D2: Technological check-up E5: Sensor project
ii) Industrial policy and strategic technology policy	Multinational enterprises Co-operations	A3: Research networks
Encourage technology and knowledge transfer to enterprises and development of innovation poles and clusters Recruiting innovators Technology transfer Innovation intermediaries Innovation infrastructure Co-operation and networking Cluster management	Enterprises Public research institutes Universities Policy makers (on the regional level)	C1: Science push tenders C2: Pre-competitive research centres Recruiting innovators A1 and A2: Attract foreign researchers and students A8: Life-long learning Technology transfer D1: User groups D3: Technology transfer by heads Innovation intermediaries E8: Integration and strengthening of bridging institutions (company side) E9: Integration and strengthening of bridging institutions (university side) Innovation infrastructure Co-operation and networking A3: Research networks D4: Shared laboratories Cluster management
Promote and sustain the creation and growth of innovative enterprises Funding innovative start-ups Entrepreneurship support infrastructure Leveraging private innovation finance Optimising financial regulations	Students General public Banks/financial sector Universities and public research	B4: Site increase Funding innovative start-ups Entrepreneurship support infrastructure B2: Platform incubators Leveraging private innovation finance/optimising financial regulations

Source: Baier *et al.* (2007), cited in OECD (2009), *OECD Reviews of Regional Innovation: Piedmont, Italy*, OECD Publishing, Paris.

Tailoring innovation to the characteristics of the Venice city-region's economy

Targeting SMEs

A specific approach towards SMEs is required, given their predominance in the Venice city-region's economy. There is evidence from Veneto that those small firms that are able to engage with higher levels of technology are likely to be more successful (Chiarvesio *et al*., 2010). Currently, there is a robust level of co-operation between small firms and district-level vocational training institutes. However, these institutes tend to concentrate on reproducing existing techniques and craftsmanship, which leaves them poorly positioned to assist firms' access to radical new innovations. Likewise, the connection between SMEs and the research community is weak, and many firms remain disconnected from the broader tendencies of managerial and productive restructuring in the regional economy. Many SMEs have not been able to promote a significant process of technological modernisation and innovation, particularly with respect to marketing, and their efforts to interact with universities and research centres have not been particularly intensive.[20]

Evidence suggests that connecting the Venice city-region's vocational/polytechnic schools to worldwide networks and technical associations can provide a model for innovation and growth for SMEs. Cluster community centres and local technical service providers in these partnerships have created a productive environment for innovative interactions among SMEs (Russo and Whitford, 2009). This process, however, requires a commitment of often more than five years to accumulate technical experience and to create trust among the participants. Habitech and GBC Italia present one example of a successful investment in intermediate structures. In this case, a technical association, promoted by a group of SMEs in the building sector, has been able to create links to an international market system of green builders and produce an Italian certification standard for sustainable buildings. This involves leading component producers and promotes integrated innovation projects among small general contractors, small suppliers, research centres and university departments. Professors and researchers at three Italian universities have been involved in the certification of a sustainable building process and in preparing training courses for the requalification of green building workers and installers (Gurisatti, 2009). Similar attempts have been undertaken in the Venice city-region area, such as the Polytechnic Institute for Shoe Making (*Politecnico della Calzatura*) in the Stràì municipality of the province of Venice.

Innovation policy should not focus exclusively on science parks, given that research has not conclusively demonstrated that the networking opportunities they offer SMEs significantly promote innovation. van Geenhuizen and Soetanto (2008) confirm that evaluation studies of science parks are either inconclusive or positive only to a limited extent. A wide range of evidence appears to support the finding that science parks have no significant effect in supporting entrepreneurship, innovation, employment growth in high-tech sectors, research productivity and technological spillovers (Shearmur and Doloreux, 2000; Siegel *et al.*, 2003; Tamásy, 2007).

The Veneto Region has successfully adopted a bottom-up policy for productive districts (R. Law 8/2003) in which regional authorities make a call for bidding for recognition and funding as a "local development system". The law was created in 2003 and is operational in the 2009-2011 period. SMEs and other regional actors sharing a common strategy and business identity can apply to become a new "constituency" and therefore become recognised as a productive district (Box 2.6). In this programme, the Regional government collects two documents for each district: *i*) a three-year programme

of the district, which outlines the long-run objectives to be achieved every three years, and *ii*) a list of annual projects of each district that aligns with targets of the district's three-year plan. The regional evaluators then analyse the coherence between annual projects and the district's constitution and validate that the district has received certification from a local Chamber of Commerce. If these conditions are met, the regional government then ranks each project on the basis of the call's specifications and other criteria for funding distribution. The regional government then issues calls for project financing, which specify the private or public agents admitted to participate in regional financing. A similar approach could be adopted to create "local communities" specialised in particular service or productive systems in the metropolitan area. Revisions could be applied to Law 8/2003 to level the playing field and ensure that it benefits smaller, diffuse groups, which may not have the tools necessary to compete with bids from larger, more organised trade associations.

Box 2.6. **Supporting emerging productive districts in Veneto: Law 8/2003**

The law instituted a three-stage competitive process:

i) **Self-organisation and self-nomination of the districts intending to play a productive role in the regional context.** The tasks of selecting districts and beneficiaries of public aid are not given to experts who measure the existence of a district on the basis of objective parameters. A district in itself is not considered a partner of any particular interest to the administration; the Veneto Region only recognises districts *per se*: networks of operators (with a strategic function in the regional economy). To be eligible, applicants need to be able to present "figures" in line with the principles of the law, which mandate a certain number of participants, co-operative links along a specific value chain, certification by a local chamber of commerce and a business plan. The regional government does not intervene to support areas that are not ready to co-finance their own proposal for strategic partnership with the administration.

ii) **Open calls for tender for projects that would meet the aims and conditions set by the districts.** Unlike in other regions, in Veneto the demand for investment, expressed by the main actors in the district, is the basis for issuing open tender calls for projects. The offer may, however, come from any agent, local or external, provided it has the required characteristics, the ability to carry out the work and the funds to cover at least 60% of the costs. The maximum public aid of 40% (or less) of the costs and the opening of tenders to individuals avoids the risk of a conflict of interest between agents that represent the demand and the agents that are organising the offer. This is intended to prevent a situation under which contracts are signed with agents that are acting simultaneously as controlled and controller, and the risk that they might become instruments useful only for securing public financing.

iii) **Selection of investment projects (public or club assets) consistent with the specifications contained in calls for tenders.** In the end, the projects and competitors that best comply with specifications solicited in the call are rewarded. In Veneto, unlike in other regions, investment projects undertaken directly by the actors who formulate the needs of a district are not permitted and supplier specialisation is favoured instead. The councillor and the entire council are given broad discretion in selecting offers and in the criteria for selecting and accrediting private promoters of the investment.

Source: Regione del Veneto (2003), "Legge regionale 4 aprile 2003, n. 8 (BUR n. 36/2003): Disciplina delle aggregazioni di filiera, dei distretti produttivi ed interventi di sviluppo industrialie e produttivo locale", *www.consiglioveneto.it/crvportal/leggi/2003/03lr0008.html* and *Gurisatti*, P. (2005), "I territori produttivi come strumenti di politica regionale, Verso un nuovo modello di politiche per lo sviluppo", in Patrizia Messina, *Una policy regionale per lo sviluppo locale*, Quaderni dell'Associazione MASTER, Dire e fare per lo sviluppo locale, CLEUP, Padua.

Cultivating the green economy

Given the expertise the Veneto has developed in flood protection and emerging efforts for renewable energy, policy makers should consider explicitly formulating a green innovation strategy. Such a policy would support the creation of green jobs in infrastructure, clean-tech R&D, green building, hydrogen and fuel cell production, and wind and solar energy. Progress has already been made at Port Marghera's Fusina power station, which is the world's first industrial-scale, 16-megawatt, hydrogen-fuelled power station. It generates enough electricity to meet the needs of 20 000 households each year and avoids the emissions equivalent of 17 000 tons of carbon dioxide, which are typically emitted when using coal-fired plants.[21] Promising initiatives at IUAV and INSULA include advanced research into water-resistant building materials, tanking systems to reservoir rising water, and plumbing technologies to resist the effects of flooding, such as one-way valves. The Arsenale, the historic shipyard in Venice, could become a hub of flood-protection techniques: in conjunction with MOSE, six warehouses in the Tese Novissime area are being built to provide facilities for monitoring and maintenance of the system. Future projects could take advantage of the EU funding available to stimulate the renewable energy sector. Part of the funding from the EU Operational Programmes could be used to leverage co-funding from the Veneto Region to foster these new green activities.

Government agencies in the Venice city-region could show environmental leadership by limiting their own consumption through greener municipal operations, including promoting the energy efficiency of municipal buildings and the greening of public transport vehicles. This is the most widespread form of local action, driven in many cases by the direct financial benefits of energy savings. For example, Los Angeles Mayor Antonio Villaraigosa supported a programme that will replace approximately 160 000 energy-intensive street lights with energy-efficient light-emitting diode (LED) lights. These targets have been rapidly achieved, because the City of Los Angeles controls key assets, such as the Port of Los Angeles and the Department of Water and Power, the largest public utility in the United States.[22] In the Venice city-region, there is still much room for government institutions to implement energy-efficiency improvements and reduce the waste they produce. In 2009, the Veneto Region defined a regional plan of investment or *Programma Operativo Regionale* (POR) negotiated with the European Union, including EUR 70 million of investments in renewable power production. This is a powerful step in the right direction and will hopefully spur additional investment.

There is a growing recognition that the greening of cities like the Venice city-region can lead to new jobs. The argument is that the economic benefit associated with a large number of mitigation activities (energy-efficient devices, green building, etc.) act as an incentive to generate new markets for new technologies and new consumer markets in urban areas. A study conducted by the United Nations, "Green Jobs: Can the Transition to Environmental Sustainability Spur New Kinds and Higher Levels of Employment?" suggests that a silver lining in the climate change story will be the creation of millions of new green jobs in green manufacturing, green construction and green energy. The report predicted that in Germany, environmental technology will quadruple over the coming years, reaching 16% of manufacturing output by 2030 and employing more people than the automobile and machine tool industries combined.[23] According to the German Ministry of the Environment, the renewable energy sector alone employed close to 250 000 people and generated over USD 240 billion in annual revenues in the mid-2000s (Seiwert *et al*., 2007). Following this momentum in the United States, Washington State

announced a comprehensive "Green Jobs and Climate Action Plan", which includes targeted investments in energy efficiency and clean energy sources that will create new jobs for the region. This builds upon previous efforts, such as Vienna's adoption in 1999 of a climate protection programme (KLIP) as a framework for its eco-business plan[24] or the Kitakyushu Eco Town in Japan (Corfee-Morlot *et al*., 2009).

As the Venice city-region pursues economic development, it is critical that it employ a model that is sensitive to the environment. As one of the world's most ecologically fragile areas, its approach to flooding and air pollution could become a reference for other metropolitan regions. Improved natural resource management and a reduction in pollution have the potential to improve the region's attractiveness and sustain both the population and the Venice city-region's high rate of tourism. Venetian clusters are in a pole position in many sectors of green technology. Such developments include small plants for renewable energy production, innovative devices and methods for waste reduction in traditional sectors. Innovative solutions for industrial and residential organisation are typically advanced, "made to measure" solutions.

Building on cultural diversity

Research suggests that cultural diversity, such as that found throughout the Venice city-region, can contribute to innovation. Highly skilled immigrants have also been found to have a positive correlation with patents generated in urban areas (Box 2.7). Hunt (2008), for example, found that a one percentage point rise in the share of immigrant scientists and engineers in the U.S. workforce is associated with an increase in patenting by at least 41%. In Canada, too, a positive and significant correlation has been found between ethnic diversity and innovative strength, though human capital and creativity indicators offers more robust explanations for innovative performance (Gertler *et al.*, 2002).[25] These studies tend to point at correlations rather than causalities and have in many cases left unexplained the reasons for the relation between cultural diversity and innovation. Unfortunately, no existing studies document whether and how cultural diversity has fostered innovation in the Venice city-region specifically. Such studies are needed in light of future immigration flows and the specific skills of the Venice city-region's immigrant labour pool.

Fostering inter-firm linkages

Inter-firm linkages among industrial districts need to be exposed and strengthened through additional value chain approaches that take into the account the Venice city-region's functional region. One useful example was conducted by Porter (2003), who identified pairs and groups of tightly linked industries based on statistically significant locational correlations. The study identified clusters with high overlap, such as education, knowledge creation and analytic instruments (Figure 2.3). Conducting a similar exercise could illuminate overlapping clusters, which might benefit from a value chain approach. After conducting a similar exercise, policy makers in Lombardy implemented a meta-district policy, which embraces entire supply chains and overcomes the shortcomings of previous policies that constrained their action to statistically defined territories, disregarding potential synergies with firms located outside the geographical confines of a cluster (OECD, 2006a). Their meta-district policy focuses on the density of networks between firms, which may resonate in the rich industrial networks of the Venice city-region. A policy intended to exploit the network effects of businesses in the Venice city-region will require a node or "downtown" for such interaction. The spatial implications of such a policy will be explored in greater depth in Section 2.4.

Box 2.7. **Immigration, innovation and business performance**

In a study on the relationship between skilled immigration and innovation in the United States from 1950-2000, a one percentage point rise in the share of immigrant college graduates in the population was found to increase patenting by 8-15%; the equivalent range for immigrants with post-college education is 15-33%. Kerr and Lincoln (2008) have quantified the impact of changes in admission levels of immigrants with H-1B visas, which govern the admission into the United States of most temporary immigrants employed in patenting-related fields. They find that total invention has increased in association with higher admission levels, primarily through the direct contributions of ethnic inventors over the 1995-2006 period. Chellaraj, Maskus and Mattoo (2005) find that both international graduate students and skilled immigrants have a significant positive impact on future patent applications, as well as on future patents awarded to university and non-university institutions**.** Their central estimates suggest that a 10% increase in the number of foreign graduate students raises patent applications by 4.7%, university patent grants by 5.3% and non-university patent grants by 6.7%. Increases in skilled immigration also have a positive, but lesser impact on patenting. Growth in a city's share of ethnic patenting has been found to correlate closely with growth in total national patenting. Across a sample of U.S. metropolitan regions over 1975-2004, an increase of 1% in a city's ethnic patenting share correlates with a 0.6% increase in the city's total invention share. This co-efficient is remarkably high, as the ethnic share of total invention during this period is around 20% (Kerr, 2008a). International patent citations confirm that knowledge diffuses through ethnic networks and manufacturing output in foreign countries increases with an elasticity of 0.1-0.3 to stronger scientific integration with the U.S. (Kerr, 2008b).

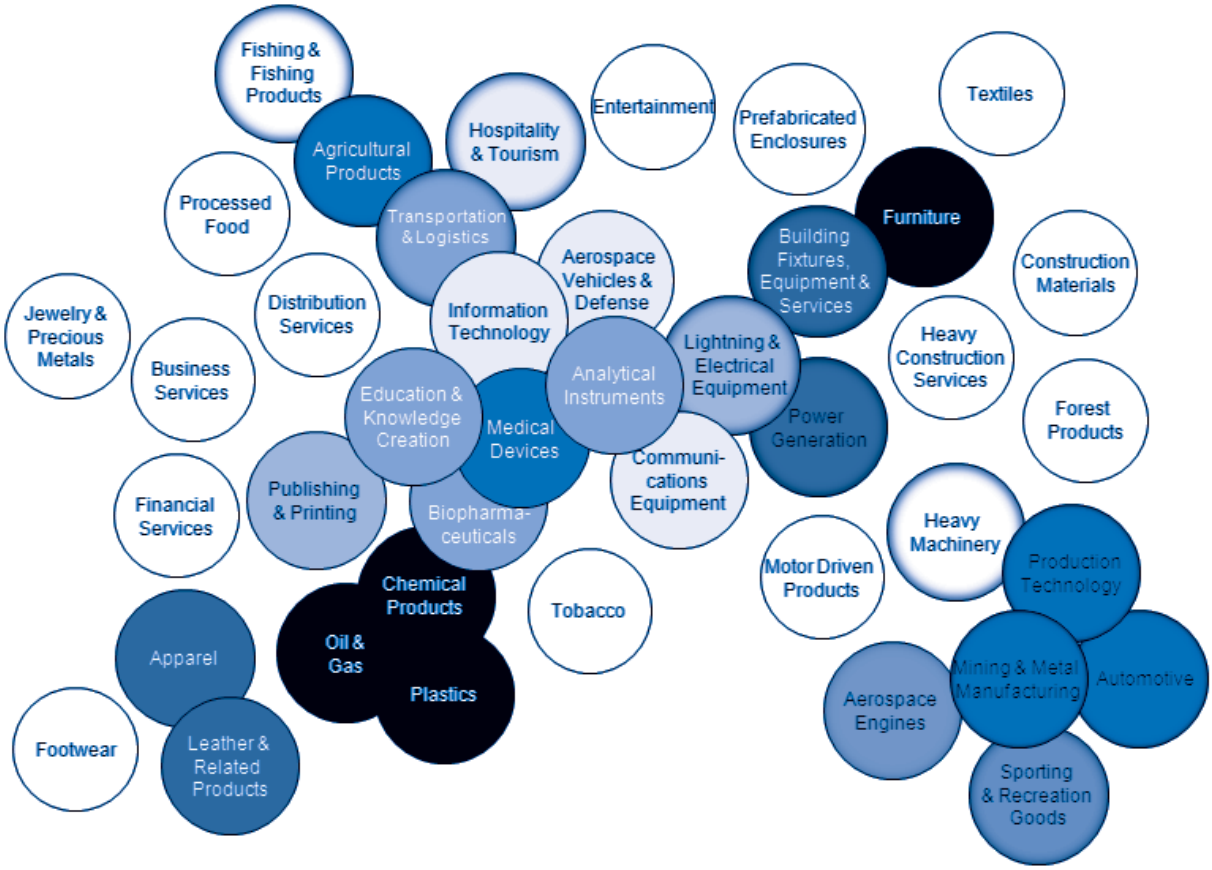
Source: OECD (2010), *OECD Territorial Reviews: Toronto, Canada*, OECD Publishing, Paris.

2.3. Preparing the labour force for the twenty-first century

There are two basic challenges for the labour market in the Venice city-region: *i*) upgrading and adapting the skills of the labour force to the new requirements of the local fabric; and *ii*) making the labour force more inclusive, especially for immigrants, women and the oldest segment of the working population. To tackle these challenges, a web of actors will need to be involved, including government institutions, training institutes and the workers themselves.

University-linked innovative capacity is contingent upon improving the scientific and technological competence of the workforce and raising the percentage of university graduates beyond its low level of 6%. As noted in Chapter 1, within the industrial districts themselves, basic manufacturing work is gradually moving to central and eastern Europe and parts of Asia and the Middle East, leaving "conceptual" and design activities and higher-skilled manufacturing tasks to be carried out within the districts (Camuffo *et al*., 2002; Camuffo and Gerli, 2007). This involves a shift to higher-level skills and underlines the urgency for education reform. Likewise, given the gradual conversion of small enterprises into medium-sized enterprises and given high generational turn-over, the Venice city-region's blue-collar labour force is vulnerable to losing the tacit knowledge it gained from hands-on training in small enterprises. The reliance on informal knowledge networks might be interpreted as efficient job matching; but it might also mean that Italian SMEs miss out on new techniques and knowledge that can only be transmitted by formal training. Furthermore, studies have demonstrated a

Figure 2.3. **Schematic diagram of cluster overlap in the U.S. economy**



Note: Clusters with overlapping borders or identical shading have at least 20% overlap (by number of industries) in both directions.

Source: Porter, M. (2003), "The Economic Performance of Regions", *Regional Studies*, Vol. 37, No.6/7, pp. 549-578.

threat of high generational turn-over; young people are not present in sufficient numbers to train and take over traditional manual jobs in such fields as carpentry, garment making and inlaying. Collectively, this translates into a loss of technical know-how (Facility for SMEs and Capacity Building, 2005).

Policy makers need to continue to emphasise the importance of the integration of immigrants, given the Venice city-region's growing immigrant labour force and low fertility rate. As a region with a strong economy, the Venice city-region attracts immigrants from Eastern Europe, North Africa and beyond. In several instances, especially where Romanians are concerned, the immigrants are part of a complex network that links work within the industrial districts to supply chains of Veneto firms in the immigrants' own countries, where some Italians are also settling. The Veneto is one of the most culturally diverse areas in Italy, and documented immigrants make up 7% of its population. It has been projected that this percentage will rise to 18.2% by 2027 (Osservatorio Immigrazione Regione Veneto, 2009). A series of policies will be needed

to align immigrant labour skills with business needs. Likewise, policies are needed to train immigrants for the positions that have become available because the Veneto's birth rate (1.35 children per woman) is below the rate needed to sustain a population (2.1 or "replacement level fertility").

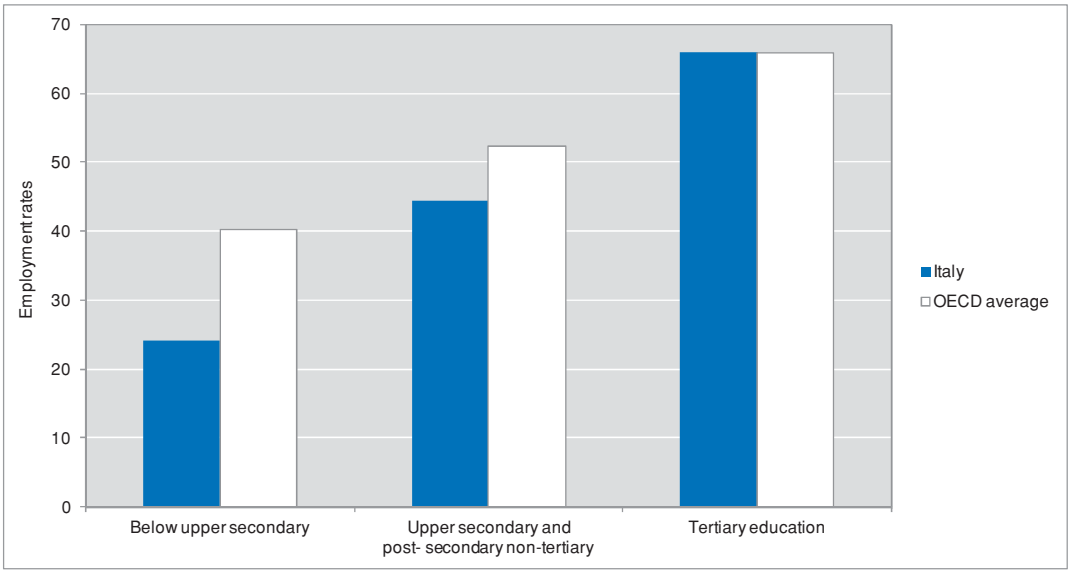
Evidence suggests that ethnic diversity may influence economic growth. On the one hand, diversity may encourage the consideration of new ideas, and change the way in which productive processes are carried out, enhancing productivity in the workplace. Recent research suggests that cultural diversity may have a positive impact on urban economies. Ottaviano and Peri (2006a) found that on average, U.S.-born citizens are more productive in a culturally diversified environment. Bellini *et al.*, (2008) provide an overview of the relationship between diversity and economic performance across a large set of European regions and find that diversity is positively correlated with productivity. These results for EU regions are broadly consistent with those found by Ottaviano and Peri (2005) for U.S. cities (OECD, 2010a).[26]

There is also a need to calibrate labour market policies to respond to widespread demographic ageing and the low economic inclusion of older workers aged 55-64. Recall that 32% of the population of Veneto is aged 55 or over and that the city-region maintains one of the highest elderly dependency rates in OECD metro regions. To decrease the dependency rate, additional measures need to target older workers, of whom only 27% are economically active. This falls below the EU15 average of 42% (2004). The low employment rate of older workers is partly explained by their low level of educational attainment relative to younger workers, which is aggravated by the infrequent opportunities for training during their careers. As in most other OECD countries, employment rates in Italy are clearly linked to levels of educational attainment, especially for older people (Figure 2.4). While employment rates are higher for highly educated people at all ages, the gap is more pronounced after age 50. Substantial differences prevail: for instance, the employment rate of highly educated older Italians is nearly three times higher than the rate of their less educated counterparts. Given that lack of training can make workers less employable, and their skills obsolescent, additional programmes could be pursued by governments in the Venice city-region designed to reach women and older workers (OECD, 2004).

Current labour market policies

The Veneto Region is engaged in a series of educational projects to improve labour-market efficiency in the Venice city-region. *Veneto Lavoro* is used to oversee the strategy established in co-ordination with the provinces, the Institutional Co-ordination Committee and the Regional Board for Social Partner Concertation. Veneto Lavoro provides support to the institutions and other bodies in planning, managing and evaluating labour policies.[27] The Veneto Illegal Labour Observatory studies and assesses juridical, social and economic aspects of illegal labour. The Regional Immigration Observatory provides data on monitoring immigration trends and researches demographic and employment dynamics, living conditions, education and training. Veneto Job Exchange, an online labour matching system, improves employment prospects and is being implemented by provincial networks as one of the pillars of Italian labour market reform (Law 30/2003 and Legislative Decree 276/2003). In addition, numerous projects have been established to strengthen the labour market in the area.[28]

Figure 2.4. **Trends in employment rates among 55-to-64-year-olds in Italy, by educational attainment, 2006**



Source: OECD (2008), "Table A8.4 Trends in Employment Rates among 55-to 64-year-olds, by Educational Attainment (1997-2006)", in *Education at a Glance 2008*: *OECD Indicators*, OECD Publishing, Paris.

The regional policy priorities are to reduce drop-out rates, establish closer collaboration between the educational and training system and the business system, and expand and innovate the range of education and training (Table 2.2). Many of these priorities are shared by the three provinces in the Venice city-region, which are engaged in a wide number of labour market policies, including a provincial observatory of human resources development services, a business incubator bureau (Padua), services for the most vulnerable workers, assistance to "returning Venetians",[29] assistance for women returning to the workplace (Treviso), training, employment services, apprenticeships and career guidance (Venice). The emphasis is on improving access to education rather than enhancing the connection between the labour market and training. Table 2.2 clearly shows how little (EUR 199 700) is allocated to improving the collaboration between the educational system and the private sector. This is a critical shortcoming given the need to develop university-linked innovation.

Towards enhanced labour market inclusion

Upgrading skills

Additional programmes and resources are needed to strengthen the links between schools, employers and their associations. Given high generational turn-over, a formal apprenticeship system would have greater potential for the transmission of tacit knowledge previously disseminated through family-based businesses. A variety of flexible forms of school-based training, alternating between education and work, would provide more experience-based forms of education. Regions can network employers, universities and vocational institutes to put these programmes in place and help

Table 2.2. **Monitored objectives of policies for human capital in the Veneto Region**

Monitored objectives	Resources allocated
Enhance access to the right to study	• Educational vouchers: EUR 9.5 million (15 555 beneficiaries) • Public transport for school and training: EUR 2 million (16 856 beneficiaries) • Textbooks: EUR 5.7 million (31 215 beneficiaries) • Scholarships: EUR 23.4 million (10 574 beneficiaries) • International study scholarships: EUR 3.7 million (290 beneficiaries)
Enhance Veneto's competitiveness through closer collaboration between the educational and training system and business	• Nine courses • One publicity campaign • Publication of a training manual (*vademecum*) • Various actions to insert students into the labour force • Note: (Resources EUR 199 700)
Publicise initiatives through promotional activities	• Sending publicity material and forms • Financial support to Expo-School • Participation in careers guidance event (EUR 15 000)
Extend and expand services for the right to study and guidance through the appropriate channels	• Allocation of substantial resources to university study boards: EUR 14.2 million for the award of accommodation for 1 437 students and EUR 1 500 for investment costs
Support the development and improvement of education in Veneto through an advanced educational research programme	• "School in hospital" project (EUR 60 000) • Interventions to support Veneto schools (support to students with disabilities, EUR 700 000)
Develop integrated educational systems	• Higher technical education and training (EUR 352 285): 12 courses, with 240 pupils • Training districts (EUR 1.4 million for six district campaigns addressed to 7 743 people)

Source: Regione del Veneto (2008), "Documento di Programmazione Economica e Finanziaria Anno 2008", *www.regione.veneto.it/NR/rdonlyres/00DF55D3-2526-46D8-A840-9C8F94ECA686/0/DPEF2008dgr85CR.pdf*.

strengthen the links between educational facilities and the labour market. Likewise, universities may need to update their career services, which are generally weak and not well-connected to the labour market. Internship programmes for those close to graduation and professional reports with partner companies would also facilitate links. Such an approach is currently being used by Bocconi University in Milan with its undergraduate and MBA programmes. Universities also need to make more of an effort to provide ongoing training. Relatively few night classes are offered, and re-entry into the education system is complicated by bureaucratic procedures. Additional reforms are needed to recognise, certify and validate competences acquired on the job, especially to motivate older, less-educated workers to enrol in training.

Target sectors with employment potential

Tourism and social care services constitute two labour-absorbing sectors that deserve support, given their capacity to create jobs. The region already has an extremely successful record in tourism, a sector that can play an important role in providing employment for less skilled workers outside manufacturing. Many aspects of tourism are useful labour-intensive activities, and the sector can accommodate a variety of skill levels. Another sector providing a wide range of employment opportunities at different skill levels is social care, a sector in which Italy typically has low employment, but to which the advanced economy of the Venice city-region might be more receptive. The experience of the Nordic countries shows how the provision of care activities (for young, old, etc.) by public services has a female employment multiplier effect: the care services provide jobs (largely for females), in turn releasing women who were providing unpaid services in the domestic economy to enter the labour force. The relative lack of professionally provided care services in Italy is a major explanation for its particularly low level of female workers. Such activity is being carried out, but within the family as unremunerated work, usually by female relatives. As a dynamic region with a relatively high percentage of women already in the paid labour force, the Veneto is among the regions of Italy most likely to lead a move into care sector employment.

Continue to support immigrant integration programmes

Increasing the use of existing labour-matching services could increase the integration of immigrants. Though a wide number of employment centres have been built to provide information to immigrants and employers, they are probably not operating at their highest potential. This was found to be the case in Milan, which has more development employment centres and a higher number of immigrants. In 2005, only 10% of Milan's businesses and 2% of its immigrants availed themselves of the services of employment centres for immigrants (Chaloff, 2006). Both businesses and immigrants need to be made aware of the advantages of using these services.

Immigrant entrepreneurship could become a vital economic force if more resources were dedicated to confronting the problems immigrants face in establishing businesses, which include lack of familiarity with the culture and economy of the Venice city-region, poor access to information, poor credit, limited business language skills, difficulty in obtaining recognition of professional skills, and lack of involvement in professional associations. Immigrants would greatly benefit not only from incentives (finance, training, employment), but also from greater diversity in the business culture, which could be provided by international and migrant workers/groups. To make the business environment more receptive to ethnic entrepreneurs, the chambers of commerce within the Venice city-region may look to Turin for an example. In 2003, Turin's chamber of commerce published a guide in the nine principal foreign languages spoken in the region, providing information on laws and authorisations and on services available (health, educational, etc.) that could be useful for immigrants wishing to start a business. Similar initiatives have been launched elsewhere in Italy. The National Artisan Confederation (CNA), for example, has aggressively recruited immigrant entrepreneurs for a number of years. In Bologna, it opened a special office for immigrant entrepreneurs, which provides a wide range of consulting, orientation and mediation services for the more than 500 immigrant entrepreneurs. The service supports the development of business plans and runs training courses for entrepreneurs. Other institutions, such as banks, have been less quick to adjust to change (Chaloff, 2006).

The involvement of professional associations would help to expedite immigrant integration. As more highly skilled immigrants arrive in the Venice city-region, the accreditation of foreign qualifications and experience will become increasingly important. Many of the regulated professions in the Venice city-region are controlled by local regulatory bodies. Often these organisations have the authority to set entry requirements and standards of practice, to assess applicants' qualifications and credentials, to certify, register or license qualified applicants, and to discipline members of the profession or trade. Toronto provides a useful reference for more actively engaged professional associations. For example, Professional Engineers Ontario, a professional association with regulatory authority over the engineering profession, allows prospective immigrants to Canada to take written examinations before their arrival and issues provisional licenses to applicants who have satisfied all the licensing requirements except the minimum 12 months of acceptable engineering experience in Canada. Professional associations also have a role in providing "bridge-to-work" programmes, which help immigrants to obtain work experience in Canada. Most of these programmes are funded by provincial and federal governments and facilitated by professional associations, education institutions and not-for-profit organisations (OECD, 2010a). The joint Treviso-Venice Chamber of Commerce could play a significant role in spearheading such involvement given its contacts with multiple professional bodies in the Venice city-region.

Insufficient use of integration monitoring

More sophisticated monitoring tools could be used to evaluate the implementation and outcome of integration programmes. Given the importance accorded to immigrant integration and the resources programmed for them, it is puzzling that governments in the Venice city-region have not undertaken an exhaustive audit of the integration services that are provided. The only existing studies use simple indexes that do not evaluate progress on socio-economic integration.[30] Improved monitoring and accountability could be achieved by adopting the metrics developed by the INTI-CITIES' *Benchmarking Integration Governance in European Cities* project.[31] Co-financed by the European Commission, this programme developed a rigorous assessment model that includes indicators for assessing integration governance structures at the local level. Its benchmark questions on the performance of inter-departmental committees for migrant integration, the public reporting of results of immigrant integration policy, and the cost-effectiveness of inter-departmental work on integration, exceed current evaluation frameworks in the Venice city-region. A more rigorous system is required, especially given the fragmented nature of integration services: housing, education and employment are all handled by different departments. This complexity differs from other systems where particular politicians are responsible for the totality of integration. In Paris, for example, a town councillor is assigned responsibility for immigrant inclusion and integration policy (*adjointe au maire de Paris chargé de l'intégration*).

Promote continuous training and strengthen the employability of older workers

There is a need for well-designed, modular, vocational training built on the recognised qualifications of older workers. Employers may be reluctant to give training to older workers because they do not expect these workers to remain long enough with the firm to gain a sufficient return on their training investment. Older workers, in turn, may be reluctant to engage in training because existing training programmes are not well adapted to their needs or because the costs of investing in further training are too high

compared with the expected financial returns (OECD, 1999, 2003). Given their low level of education, older workers may have a negative attitude towards classroom instruction. There is some evidence that older workers' relatively low rate of enrolment in training is primarily due to a lack of demand (OECD, 2003). Furthermore, older workers in the Venice city-region are particularly vulnerable, given their high activity rates in SMEs, which offer less job-related training than larger businesses. According to the second European Survey of Continuing Vocational Training, about 52% of employees in large firms in Italy[32] received job-related training in 1999, compared to 11% of employees in small firms (OECD, 2003).

The central government has a key role to play in promoting life-long learning through the inter-occupational fund (*Fondi interprofessionali*). Public funds are directed to the social partners in order to build up a new system of continuous training. This fund is financed by an employer contribution of 0.3% of wages. The initial level of this fund was EUR 181 million, and since 2004, it has provided consistent funding for investments in continuous education (Ministry for Labour and Social Policies of Italy, 2003). Its promoters should ensure that the fund reaches workers who will most need it in the future, namely those with few or obsolete skills.

2.4. Connecting Venice, Treviso and Padua: overcoming urban sprawl and improving mobility

Building metropolitan synergies: an unfinished project

As noted in Chapter 1, connectivity and mobility between Padua, Treviso and Venice suffer from the effects of a sprawling spatial structure, which facilitated the industrial model of the city-region from the 1960s to the 1980s. With few planning regulations and inexpensive land, residents converted rural into residential areas, and many developed family-based businesses on the side. Many of these small businesses grew into mini-workshops, or *capannoni*, which grew in capillary fashion throughout Veneto (Bialasiewicz, 2006). The process of land consumption caused by the diffused spatial pattern of production activities has been supported by local municipal zoning policies of emphasising the need for industrial uses in their plans when submitted to the regional and provincial governments for review and approval. Traditionally, land use plans met opposition, and farmers were allowed to disregard plans, which produced a discontinuous development of scattered activities throughout the Venice city-region. As many of the technologies in these *capannoni* become obsolete and the regional economy shifts towards services rather than the tradable sector, new opportunities arise for a more rational spatial model. In addition, local governments in the Venice city-region are burdened with infrastructure extensions and heavy water consumption, which stem from older and spatially diffused developments.[33]

Though low-density development may have been a pre-condition for rapid industrial growth in the late twentieth century, today it counteracts interactivity between and among Padua, Treviso and Venice. The previous model of sprawling development enshrined an inefficient and non-economical rationale for infrastructure extension, elevating capital costs related to the construction of more schools and extending roads, water and sewer lines and storm water drainage systems.[34] Furthermore, the sprawling spatial structure has encouraged the construction of single-family residential homes and failed to create favourable housing construction economies for low-cost, middle-density housing, such as

two- and three-story row houses. Throughout the Venice city-region, there is consequently a lack of affordable rental housing stock, especially transit-oriented development (TOD) located in high-density nodes along transportation corridors. The inadequate metropolitan transportation system has increased workers' costs of commuting and extended the time wasted in traffic. This has been associated with productivity losses.

The sprawling spatial structure has not given the area the critical mass necessary to support a metropolitan-wide public transit system, which has resulted in the dominance of motor vehicles, traffic congestion, rising air pollution and constraints on mobility. Similar effects have been experienced in other OECD metro-regions, such as Cape Town, where "the sprawling growth of the city-region has produced a highly fragmented urban economy with strong spatial polarisation. The distorted urban passenger-transit system has increased wage costs and overall costs of living, restrained economic dynamism of Cape Town and compromised environmental sustainability" (OECD, 2008b). In Venice, urban sprawl has been aggravated by inadequate rail-port links, which have hindered the Port of Venice's distribution linkages and forced it to rely on road transport, thereby increasing congestion. The Venice Port Authority has acknowledged the need to create a logistical network based on the interaction between the port and the logistic areas of the hinterland, to improve freight distribution.

The Venice city-region is also relatively disconnected from the north-west Italian and European urban system and lacks a high-speed rail connection to Milan. A project for the Padua to Verona link, which would connect the Venice city-region to Milan, has been proposed but not financed. Only a small proportion of the goods produced in north-eastern Italy pass through Venice's port: of the 1.3 million containers originating from the north-east, only 25% pass through the Port of Venice each year. The rest go through the Tyrrhenian and northern European ports, coming to north-eastern Italy by railway, travelling in some cases for more than a thousand kilometres, to be delivered to a place a few kilometres from another port. Likewise, the Venice city-region is not integrated into two larger Trans-European Networks in the Transport Sector (TEN-T) projects. These include the east-west axis of Lyon-Trieste-Ukrainian Border (TEN-T Priority Project No. 6) and the north-south axis of Berlin-Verona/Milano-Palermo (TEN-T Priority Project No. 1).

A groundswell of infrastructure programmes testifies to the government's realisation that the lack of a polycentric metropolitan transportation system has limited inter-firm linkages, agglomeration economies and intra-regional trade. Numerous projects have been launched to bind the region together through additional bypasses, rail links and road improvements. These efforts are promising in their potential to strengthen network effects between Padua, Treviso and Venice. A more tightly connected system could optimise local supply chains, which often spill over multiple districts.

Visions for the Venice city-region

Three main streams of policy influence connectivity and densification in the city-region: transportation, regional planning and municipal land use codes. Specifically, the primary policies include the Veneto Region Regional Transport Plan (*Piano Regionale dei Trasporti*, PRT), the Regional Territorial Coordination Plan (*Piano Territoriale Regionale di Coordinamento*, PTRC), the three Provincial Territorial Coordination Plans (*Piani Territoriali di Coordinamento Provinciale*, PTCP), and a web of municipal laws on land use.[35] It should be noted, however, that the Venice city-region is not a formal entity. The metropolitan area of Venice was first defined in Regional Law 36 of 1993, but

the area circumscribed in this law was much smaller than the area that is being analysed in this document. Though Article 114 of the Italian Constitution (2001) established a new administrative body, the metropolitan city (*città metropolitana*), the legislation does not clearly state which duties this new form of government would perform and the processes required to institute it.[36] Without clarity on this point, it is difficult to assign responsibilities to the range of different actors in the city-region engaged in fostering synergy in the Venice city-region, including the region, provinces, municipalities, motorway companies, Italian Railways and local transport companies.

The 2005 Veneto Region Regional Transport Plan acknowledges the need for greater inter-metropolitan mobility. It defines the metropolitan area as one in which "mobility has metropolitan characteristics, even if no large cities are to be found", and specifies a strategic objective for the definition of transport and accessibility policies,

> ... [a] functional reorganisation of the region's road system is urgently necessary, and it should be carried out in light of an organic and integrated strategy for other inter-regional mobility policies, particularly for railways, which seeks to provide a coherent, strategic response to the demand for mobility that comes from the reorganisation of functions in the territory.

With this in mind, the RTP devotes considerable attention to an ambitious project called the Regional Metropolitan Railway System or *Sistema Ferroviario Metropolitano Regionale* (SFMR). This project, currently in the first stage of construction, will build a local railway transport system to cover the whole region, with Venice, Padua and Treviso serving as the main nodes. Complementary works will include the re-organisation of the bus routes to ensure interchangeability between road and rail transit, along with the adoption of a municipal tariff system for all the involved transport firms. The Regional Transportation Authority projects that after the completion of the SFMR, rail passengers will increase by 74.2%, car users will decrease by 7.7% and bus passengers will decrease by 32.3%. Many of the trains will be high-speed, as already implemented in the Padua-Venice/Mestre link and approved for the Venice to Marco Polo Airport route.[37]

The Provincial Territorial Co-ordination Plans (PTCP) have recently espoused creating synergy between Padua, Venice and Treviso, an effort that has been complemented by regional and municipal land use plans encouraging densification. The PTCP of the Province of Venice, for example, confirms the promotion of interactivity in the polycentric system.[38] Particular municipal initiatives have adopted a "land realignment" approach, such as the municipality of Casier, which reached a relocation agreement with firms located in inappropriate areas, *i.e.* low-density areas disconnected from transportation nodes or sites that are in need of expansion.

Forthcoming challenges: connecting Venice to the outside and curbing sprawl from the inside

Connecting the Port of Venice to Veneto and the world

Improving rail-port connections with the Port of Venice could strengthen its competitiveness and improve connectivity throughout the Venice city-region. Of course, Venice will not be able to challenge Rotterdam in any near future, but the focus should be on taking back its natural market in the rich industrial and agricultural heartlands of north-east Italy and expanding its reach northwards into southern Germany, Austria and beyond. The 800 000 companies of north-east Italy, which produce 20% of Italy's GDP, are potential customers of the port. Additional policies are needed to relieve the

congestion of road and rail networks. Its gradual repositioning has the potential to reduce congestion and improve intra-metropolitan mobility if truck traffic is gradually replaced by rail or use of the riverways. Such policy proposals should be implemented in tandem with the port's green port[39] and internationalisation strategies (Box 2.8).

Box 2.8. **The Port of Venice's internationalisation strategies**

The Port of Venice provides a reference for co-operation with other ports and port cities. The Adriatic Ports Community, for example, was founded in Venice in 1955 by the mayors of Venice, Trieste, Ravenna and Ancona, and is supported by approximately 50 associates among regions, provinces, chambers of commerce and port authorities. In more recent times, the city of Venice acted as the lead partner of the *INTERACT* project from 2004 to 2007. Consistent with the *INTERACT* programme objectives, IONAS aims to enhance the experience of ongoing or already concluded projects carried out in the Adriatic and Ionian area within the (EU Cohesion Policy's) *INTERREG* Initiative. The project, which has engaged 26 cities and organisations, focuses on improving co-operation among the ports and between cities and their ports. Particular emphasis is placed on the minimisation of the environmental impact of port activities and on enhancing the co-operation to create a "Port Community". Finally, the Venice Port Authority is investing in the development of the *Motorways of the Sea* project, in order to position the Port of Venice as the north-east gateway of the *Motorways of the Sea* to Greece. At the end of 2006, the Port Authority, together with *Rete Autostrade Mediterranee* (RAM-Sviluppo Italia) and the Veneto Region, has prepared a Master Plan that foresees more than EUR 230 million in investments for the strengthening of road and rail connections and the improvement of maritime accessibility. Furthermore, the Authority, together with the Greek ports of Igoumenitsa, Patras and Corinth, four shipping carriers and several road-transport companies, has initiated the *ADRIAMOS Project for the Motorways of the Sea-East Med*. This project involves different maritime transportation solutions, supported by port infrastructure and ITC systems, which hope to connect Tangier to Barcelona, Barcelona to Genoa, Genoa to Venice, and finally Venice to Greece through the Egnatian Way.

Sources: Capocaccia, F. (2008), "Motorways of the Sea in the MED: Marco Polo and TEN-T Programmes", Marco Polo Conference, Venice, *http://ec.europa.eu/transport/marcopolo/events/docs/venice/fabio_capocaccia.pdf*; European Commission (2009), "Marco Polo: New Ways to a Green Horizon", *http://ec.europa.eu/transport/marcopolo/home/home_en.htm*; Revedin, A. (2008), "Port of Venice: The Role of a Second Tier Port in the Modal Shift", powerpoint presentation, Marco Polo Conference 2008, *http://ec.europa.eu/transport/marcopolo/events/docs/venice/antonio_revedin.pdf*.

Additional funding is required to connect the Port of Venice to trans-European rail networks. The Port of Venice's support of an Adriatic-Baltic "land bridge" could lead to the penetration of new markets. Venice, however, is fortunate in that the two networks receive the highest contributions from the TEN-T budget, receiving EUR 960 million and EUR 755 million respectively. Additional funds could finance the completion of gaps in the rail network that would connect Venice with Germany via the Brenner Pass and Austria via Tarvisio.

Towards a re-urbanisation of the Venice city-region

Densification can provide a series of economic advantages for the Venice city-region. In terms of public spending, high density affords economies of scale in relation to the public and private provision of urban infrastructure, services and amenities. It allows for the efficient use of land and public services, yet tends to be more energy efficient and requires less land for urban development. Equally important, high densities make public transportation more economically and technologically viable. Densification policy could

be assisted by a reduction of the barriers to entry into the home-building industry. Governments could also consider adopting more innovative strategies of distributing and trading development rights, as suggested by Micelli (2002). Particular relief is needed for the low end of the rental market, where more favourable rental housing construction economies could be created. Low turn-over rates and long waiting lists have constrained the private rental market, and municipal governments in the Venice city-region might consider policies to reduce the barriers of entry into the home-building industry.[40]

A greater enforcement of densification policies is necessary to create a more connected metropolitan land system. Though Law 11 of 2004 should be viewed as an accomplishment, it has not adequately counteracted the trend of low-density land use. It discusses densification, but favours raising height limits rather than developing high-density nodes at strategic transport corridors within the Venice city-region. It is doubtful that the Law, despite its planning goals and vision, has the strength to obtain results of balanced and sustainable development. Indeed, while the Law introduces and codifies new planning instruments, it has no bench-marking provisions (density standards) to limit spatial growth.

Mestre could act as a gateway to north-east Italy, given its central location and large population. Although it is the largest agglomeration in the Venice city-region, it lacks a distinct identity in the Italian north-east and even within the Veneto Region. Mestre could be marketed not as a blue-collar industrial city, but as a key hub of a larger metropolis. Efforts should take advantage of the spaces for redevelopment in the area, which will soon serve as the central hub of the Regional Metropolitan Railway System of Veneto. A series of initiatives has already been launched that would capitalise on the shifting of the centre of gravity to Mestre (Box 2.9).

Box 2.9. **Mestre: a future gateway to the Venice city-region?**

About 20 major projects are under way to change urban conditions in Mestre, a neighbourhood largely built in the second half of the twentieth century, and which, in spite of its issues with historical Venice, four times voted down referendums proposing to secede from the *Serenissima*. Assets it can leverage include 135 hectares of interspersed green space, unused soccer fields, community gardens and small wooded areas. Joint venture shareholdings between public and private sectors are being adopted to create hubs of technological and management development of advanced service industry, as well as *ad hoc* corporate management entities for special projects and area-wide service delivery. The projects to be completed by 2013 are:

- 2 800 units of affordable housing
- an urban trolley line
- a university campus
- a city market
- a multi-purpose auditorium
- renovation of the historic villa Erizzo
- an urban renovation scheme for the Altobello neighbourhood
- retrofitting of the former Umberto I hospital complex
- expanding the existing 70 kilometres of bicycle paths (2008)
- an archaeological itinerary
- a Mestre Bypass special project administration
- a science park (VEGA and Veneto's nanotech companies)
- an integrated public transport system for the Venice city-region

Source: Fondazione Gianni Pellicani (2009), "Abitare Mestre: città e società in transformazione", *www.fondazionegiannipellicani.it/sites/default/files/abitaremestre.pdf*.

Sub-national governments could adopt a stronger stance against sprawl by prioritising transit-oriented developments and fast-tracking development reviews of these proposals. Several tools could be used, ranging from increasing the density of urban development to zoning reform, to create incentives to increase mixed-use developments that combine residential with non-residential land uses. Often the reduction of "soft costs" – design fees, appraisals, environmental site studies, legal work, financing consultants – can make projects more attractive to innovative builders. Governments in the Venice city-region could finance the costs of environmental and other studies, either as a grant or seeking repayment at zero or low interest at the end of construction. This assistance could be evaluated by municipal planning departments in consultation with community members and housing providers.

To achieve denser urban development, government officials might consider adopting policy tools in addition to densification policies. Zoning reform and incentives to increase mixed-use developments, which combine residential and non-residential land uses, could create more liveable and walkable communities (Table 2.3). Policies to reduce urban sprawl may result in higher residential densities within the urban area, but they allow for greater flexibility than specific residential density targets. For example, for the purpose of infill development and densification, local governments outside the historic centre of Venice may find it advantageous to encourage the development of smaller "accessory dwelling units". These are commonly known as in-law units, carriage houses or secondary apartments. Such a strategy may have particular appeal to communities in Mestre, whose homes are generally newer and more able to accommodate the stress of additional floors and physical alterations. Likewise, the adoption of form-based codes in the Venice city-region could be used to achieve a community vision based on re-urbanisation, minimising land consumption and the creation of high-density, transit-oriented communities.

Connecting housing production with a metropolitan transportation system

The encouragement of compact neighbourhoods along high-capacity transportation corridors could be pursued through the utilisation of additional tools. Authorities in the Venice city-region could encourage more transit-oriented development (TOD) if such projects could prove that they would produce fewer vehicle trips, increase transit ridership and reduce greenhouse gas emissions from both housing and transportation. Already such an approach can be seen in the construction of the business centre, VenetoCity, which has prioritised the use of public transport for its employees and its location at a key junction next to the regional metropolitan railway station. A variety of models could be used to capitalise on this momentum, such as the provision of grant funding for infrastructure-related portions of a TOD, *e.g.*, storm water, sewer or utility upgrades.

Given the fluidity of the labour market and the urban-rural interface in the Venice city-region, an evaluation of the regional affordable housing stock could be a useful exercise. In many respects, this has been the missing level in housing policy in Italy. To implement a regional affordable housing policy, the Veneto Region together with the Cities of Venice, Padua and Treviso may opt to follow Vancouver's example and first commission a discussion paper for a *Regional Affordable Housing Strategy*, which would then inform a debate around a regional affordable housing action plan.[41] Critical to the framing of this project is a consideration of the direct effects of growth management and land use planning regulations on the stock of affordable housing.[42] Such an evaluation

Table 2.3. **Development policies to manage urban sprawl and control land consumption**

Policies for managing urban growth	Policies for protecting open space
Public acquisition	**Public acquisition**
Fee simple public ownership of parks, recreation areas, forests, environmentally sensitive areas, etc.	Fee simple public ownership of parks, recreation areas, forests, environmentally sensitive areas, etc.
Regulation	**Regulation**
Development moratoria, interim development regulations	Sub-division exactions
Rate of growth controls (such as building permit caps), growth-phasing regulations	Cluster zoning (incentives often provided)
Adequate public facility ordinances	Down-zoning or large-lot zoning
Up-zoning or small-lot zoning, minimum density zoning	Exclusive agricultural or forestry zoning
Mixed-use zoning	Mitigation ordinances and banking
Transportation-oriented zoning	Non-transitional zoning
Greenbelts	Concentrating rural development
Urban growth boundaries	
Urban service boundaries	
Comprehensive planning mandates (master plans)	
Incentives and fiscal policies	**Incentives and fiscal policies**
Development impact fees	Right-to-farm laws
Real estate transfer tax	Agricultural districts
Split-rate property tax	Transfer of development rights
Infill and redevelopment incentives	Purchase of development rights, conservation easements
Brownfield redevelopment	Use-value tax assessment
Historic rehabilitation tax credits	Circuit breaker tax relief credits
Location efficient mortgages	Capital gains tax on land sales
Priority funding for infrastructure in the city centre	

Source: OECD adaptation based on Bengston *et al.* (2004), "Public Policies for Managing Urban Growth and Protecting Open Space: Policy Instruments and Lessons Learned in the United States", *Landscape and Urban Planning*, No. 69.

would need to take into account such factors as opportunity costs – of using the land for agriculture, the resources used to construct the housing, and the cost of infrastructure, *e.g.*, schools, police and fire protection, water and wastewater, and transportation services – the present location value and future location value of a development.

Notes

1. The Veneto Region affirms,

   Given the region's aspiration to attain European goals, and on the basis of the current trends, the result is that there is an increasing need to transform Italy and the Veneto into main players in the knowledge community, abandoning the no longer sustainable model of "development without research" and adopting the only possible model in this era of the global economy, namely, the "research-based development" model. This goal requires a strategy shared by all the players, to be implemented by creating synergies between local networks of small companies, universities and research centres, with the aim of implementing a virtuous circle that would promote general growth, the productivity and competitiveness of companies and further stimulate the ongoing innovation activities themselves (Regione del Veneto, 2007a).

2. Within patenting rankings for Italy, Veneto scores high, ranking third for the number of Italian patents (13.1% of the total Italian patents) (EUROSTAT, 2006).

3. Venetian SMEs, when they take part in a local district or network, share knowledge production with many partners. The cost of investment is then individually small and sustainable for each partner in the "cognitive chain", although collectively it could be significant and comparable to the investments of much larger competitors.

4. Italian Angels for Growth selects projects and young, promising enterprises for submission to its members for approval. The decision on the funding level results from an initial assessment of the business plans presented by the entrepreneurs. Evaluation meetings are held four to six times a year, during which two to four of the most noteworthy projects are presented to the members. This is followed by a due diligence process, after which the funding is finally negotiated. All plans that pass the due diligence and negotiation phases are offered to those members who want to undertake the investment (the association's involvement ends at this stage). For each investment, each member investor prepares specific contracts and identifies the company structure suitable for the investment and the closing.

5. These networks in turn depend on two specific sub-classes of institutions that Lane (2005) refers to as "scaffolding structures": "institutions that provide both a meta-stable identity for system agents and the possibility for renewal and change for the system itself". In the districts, he argues, the existence of interaction loci and emergent rules and roles are at the centre of a model premised on rapid reaction to uncertain markets, insofar as these scaffolds enable what Lane – with Maxfield (1997, 2005) – calls "generative relationships". That is, they must enable recurring interactions among heterogeneous agents capable of inducing changes in how agents interpret themselves, other agents and artefacts, thus creating innovations that are generally characterised as new entities.

6. Other technology districts included wireless applications (Piedmont), ICT (Lombardy), biotechnology (Lombardy), aerospace technologies (Lazio), advanced materials (Lombardy), innovative technologies for seismic risks (Basilicata), molecular biomedicine (Friuli-Venezia Giulia), renewable energy and environmental

technologies (Trentino), logistics (Calabria), polymeric materials and compounds (Campania), ICT and security (Tuscany), cultural heritage (Calabria), mechatronics (Emilia Romagna), food security and quality (Abruzzo), biomedical and health technologies (Sardinia), agro-industry (Molise), naval transportation (Sicily), integrated smart systems (Liguria), agro-industry (Puglia), sustainable bio-agro and fishery (Sicily), high-tech (Puglia), nano-micro technologies and special materials (Umbria), microelectronics (Sicily), and medical technologies (Puglia).

7. In particular, this decree made the regions responsible for overseeing the implementation of national policies and funding streams in the regions. The national government reserved a number of powers, including the right to define strategies and implementation guidelines nationally, and retaining the exclusive competence for research support. Further major changes occurred with the Constitutional Law No. 3 of 2001, which expands the powers and autonomy of the regions by defining all competencies to either the state or regional level, or as co-competencies, with the presumption that all non-reserved powers belong to the regions (OECD, 2009c).

8. Article 117 – The state has exclusive competence in university research, national research institutes and academies, strategic infrastructure, pre-competitive industrial R&D and development programmes for industrial districts, Italian-European scientific infrastructure and IP protection. Co-competence was defined as education, science and technology; research and support for manufacturing R&D. Reserved to the regions are all territorial development functions, including SME innovation, technology transfer, and research mobility.

   Article 119 – Established the principle of financial autonomy: lower levels of government may levy taxation and revenues in accordance with the Constitution and the national public finance and tax system. Sub-national governments must be fully and suitably recompensed for the additionally decentralised spending functions.

9. Galileo Science Park is a consortium formed of the Chambers of Commerce of Padua, Treviso, Vicenza and Belluno, Padua University, the Municipality and the Province of Padua, the Fondazione Cassa di Risparmio di Padova e Rovigo bank and Veneto Innovazione. The mission of the Galileo Science Park is to support the competitive capacity of companies by carrying out activities and providing services connected with the spreading of innovation, technology transfer and the results of applied research. VEGA Science Park is a limited responsibility co-operative society that also includes as members Consorzio Venezia Nuova, Consorzio Venezia Ricerche, the Municipality of Venice, Enichem, the Province of Venice, Veneto Innovazione, the two Venetian universities, Ca' Foscari and the University Institute of Architecture (IUAV), and also other private firms.

10. Universities include the University of Padua, Cà Foscari University of Venice, Venice's University Institute of Architecture (IUAV) and one consortium of international universities (Venice International University). These employ 3 130 full-time faculty members and enrol 83 807 students each year (Ministero dell'Istruzione, dell'Università e della Ricerca, 2007). The Academy of Fine Arts and the Benedetto Marcello Music Conservatory are both located in Venice. In addition, the Venice city-region hosts a total of 118 technical institutes in agriculture, commerce, tourism, manufacturing, architecture, social affairs and aeronautics. These break down as follows: 44 in the province of Padua, 42 in the province of Treviso and 32 in the province of Venice.

11. It is based on the following lines of action: technological transfer with regard to materials, supporting the transfer of the results of scientific research to the

manufacturing fabric and the promotion and diffusion of the regional innovation system's expertise. Veneto Nanotech collaborates with export consortia, craft associations, small and medium-sized industry associations and the foreign trade offices of the Veneto chambers of commerce. The main objective pursued is to increase collaboration in project work between research centres and the manufacturing system, above all in high-tech sectors and in nanotechnologies in particular. The planning instruments are a *i*) three-year research, innovation and technology transfer plan; *ii*) a regional operating plan 2007-2013; and *iii*) industrial district plans.

12. The Port of Chioggia and the redevelopment of Murano Island comprise two project examples of the 2000-2006 funding period. For Chioggia, a historic key Italian port in decline in the early 1980s, the ERDF funded the acquisition of a second terminal on the Val de Rio site. This greatly facilitated the adaptation to the requirements of multimodal transport. With Murano Island, ERDF funds supported the conversion of old buildings in the small-scale glass manufacturing sector. These resources assisted the Venice city authorities, who had purchased an entire area in order to rehabilitate architectural heritage and production facilities (European Commission, 2004).

13. There are some important experiences in which "wall-less institutes" have generated and supported knowledge-based regional economies and innovation hubs. For example, within the region of San Diego, the close partnership between Novartis, the Genomics Research Institute of the Novartis Research Foundation and the Scripps Research Institute (TSRI) was essential in creating labour pooling and innovation in biotechnology. In the case of the Brazilian aerospace industry, this was clearly the case through the close partnerships between the EMBRAER, the Centre for Aeronautic Technology (CTA), the National Institute for Space Research (INPE) and the Technological Institute for Aeronautics (ITA). In all these cases, separate organisations formed a dense set of interpersonal relationships through joint teaching, research, exchange of staff, and joint testing and development of engineering.

14. In the United States, universities have become key actors in levying research grants. The University of Washington in Seattle, for instance, attracted USD 750 million in 2004, directly stimulating the regional economy as well as providing new intellectual platforms for regional cluster initiatives in the life sciences, IT, biotechnology and other high-tech growth sectors. Johns Hopkins University, located in Baltimore, Maryland, attracted USD 1.3 billion in 2004 (Centre for Measuring University Performance, 2007, cited in OECD, 2008b).

15. At the beginning of 2007, a working group was created by the chancellor of the University of Padua to study the feasibility of a university project aimed at creating a multi-centre "Politecnico of the Veneto". This would have been a university institution with specialised engineering and architecture courses, under a system that would have recognised the international scientific achievements of faculty from within Italy and those drawn from outside. The initiative was not approved.

16. Concerned about weaknesses related to the state's capabilities and attractiveness for technology-oriented economic development, the U.S. state of Georgia established the Georgia Research Alliance (GRA) in 1990. GRA is a non-profit, public-private partnership involving six leading research universities in Georgia, state agencies and private sector business representatives. The six universities are: University of Georgia, Medical College of Georgia, Emory University, Clark Atlanta University, Georgia Institute of Technology and Georgia State University. The GRA channels investments in strategic and emerging technological fields within the research

universities to support eminent scholars, new research laboratories and equipment, research and innovation centres and technology transfer. A core aim of the GRA is to create pools of entrepreneurial scientific talent and research capabilities that can build up the state's research profile and stimulate the commercialisation of technologies by companies in the state. Since 1990, the state has invested more than USD 400 million in the GRA (through tax revenues and bond proceeds), an annual average investment of about USD 26.7 million annually. To date, nearly 60 eminent scholars have been appointed at GRA universities. It is estimated that since the GRA started, the state's investment has leveraged about USD 2 billion in new R&D funds (from the federal government and private sources), attracted 120 new university researchers, stimulated 100 new high-tech companies, and added more than 2 000 private-sector high-tech jobs (OECD, 2008b).

17. The ambition expressed in this strategy is that in 2015, the Capital Region should be Northern Europe's most attractive metropolis in which to live, work, study, do business and visit. The strategy includes a variety of concrete measures to achieve this goal (OECD, 2009d).

18. CIVEN is an association between the University of Venice (Cà Foscari and IUAV), the University of Padua and the University of Verona, devoted to the promotion of research and training activities in the field of nanotechnology. It offers post-graduate training (an International Master's in Nanotechnology Management) and provides a vehicle for research in nine specific areas: nanostructures for chemical and biochemical sensors; layers with improved tribological properties and resistance against corrosion; nanostructured materials for protective or decorative coatings; thin films with nanometric dimensions and thick coatings made of organic, inorganic, hybrid nanocomposites; micro arrays for genomics; development of nanocomposite polymer systems; development of nanostructured materials; development of sensors for the agricultural and food industries; monitoring and risk assessment of nanotechnologies in production environments.

19. The centres and institutions included in the network are the University of Padua, Cà Foscari University of Venice, IUAV, NRC of Padua (Ionised Gases Institute, Institute for Energetics and Interphases, Inorganic Chemistry and Surface Chemistry Institute, Biomedical Engineering Institute, Research Institute for Hydro-geologic Protection, Institute for Structural Technologies, Molecular Science and Technology Institute, Institute for the Dynamics of Environmental Processes, Institute of Atmospheric and Climatic Sciences, RFX consortium), National Institute for Condensed Matter Physics (INFM Padua section), Galileo Science and Technology Park (Padua), VEGA Science and Technology Park (Venice), Star Science Park (Verona), Venetian Institute of Molecular Medicine (VIMM, Padua), G Space Studies and Activities Centre. Colombo (CISAS, University of Padua), Glass Experimental Station (Murano, Venice), Italian Institute for the Certification of Optical products (Certottica, Belluno), European Center for Living Technology (ECLT, Venice) and the National Consortium of Matter Structure (CNISM, Padua).

20. The lack of interaction between companies and universities mirrors that in the Spanish system. For instance, according to OECD data, more than 80% of Spanish firms have never contacted a university to collaborate on a research project. Between 2001 and 2004, only 4% of innovative firms co-operated with universities (OECD, 2006c).

21. For additional material, read New Energy News, "First H_2 Power Plant, Far from the H_2 Economy", *http://newenergynews.blogspot.com/2009/08/first-h2-power-plant-far-from-h2.html*.

22. In other cities, governments are beginning to adopt "fifty-fifty" programmes that encourage public schools, libraries, and hospitals to cut their energy costs. Public institutions in these cities that save over 50% of their energy are free to re-programme the savings back into their own budgets.

23. For more information, consult United Nations Environment Programme (2007), "Silver Lining to Climate Change – Green Jobs", press release, 6 December, *www.unep.org/Documents.Multilingual/Default.asp?DocumentID=523&ArticleID=5717&l=en*; United Nations Environment Programme (2007), "Landmark New Report Says Emerging Green Economy Could Create Tens of Millions of New 'Green Jobs'", w*ww.unep.org/documents.multilingual/default.asp?documentid=545&articleid=5929&l=en*.

24. The plan was introduced to help enterprises operate and generate profits through eco-friendly practices that benefit both the environment and the economy. No fewer than 527 enterprises have participated in the Eco-business plan, implementing more than 9 000 environmental projects. Eco-business is now being implemented in other cities, such as Athens.

25. This is the correlation between the Mosaic Index and the Tech-Pole Index.

26. Following Roback (1982), Ottaviano and Peri (2006a) develop a model of a multicultural system of open cities that allows them to use the observed variations of wages and rents of U.S.-born workers to identify the impact of cultural diversity on productivity. They find that on average, U.S.-born citizens are more productive in a culturally diversified environment. This is robust to the use of instrumental variables, implying a causal relationship between diversity and productivity. This result is qualified in two respects. First, cultural diversity in a locality has a negative effect on the provision of public goods, which is consistent with previous findings at the national level. Second, the positive effects are stronger when only second- and third-generation immigrants are considered, which suggests that the positive effects are realised only when some degree of integration between communities has taken place. The foregoing insights somehow contrast with earlier findings by Borjas (1995 and 2003) showing a negative impact of immigrants on the wages of native-borns and a positive impact on capital returns. However, these findings rely on the key assumptions of perfect substitution between native-borns and foreigners, as well as on a fixed capital stock. Allowing for imperfect substitutability between native-borns and foreigners as well as endogenous capital accumulation, Ottaviano and Peri (2006b) find that the effects of immigration on the average wages of native-borns are positive and quite significant (OECD, 2010a).

27. It also aims to provide institutions and society with the tools and the specialised help necessary to learn, study and promote active labour policies, monitor labour market trends, run the Veneto employment information system and work on innovative projects both in the context of the enlarged European Community market and in the interests of the simplification and transparency of relations with citizens and business.

28. Talentaged has developed a new integrated methodology for job guidance in the change processes undergone by elderly workers of both sexes. Migravalue develops a network of labour market institutions in Eastern Europe. It is experimenting with a system to handle the migrant remittances of non-EU workers that promotes policies to

encourage local development in their countries of origin and their return to these countries. Routes supports the trans-national co-operation network and encourages the exchange of good practices and new immigrant integration methodologies.

29. The Veneto Region has been especially active on this front. The *Progetto Rientro Emigrati* (a project to repatriate immigrants of Italian descent) implements the mandate of Law 9 of 2003 (norms in favour of Veneto residents living abroad and to facilitate their return: three-year plan, 2004-2006), which was prompted by the political and economic crisis in South America at the beginning of the decade. In addition to creating a consultative forum for the regional executive (*Consulta dei Veneti nel mondo*), the law provides ample benefits for immigrants eligible for them, going back three generations, including information offices abroad and housing and professional education support.

30. Indicators consisted of basic metrics such as programme funding levels, eligibility criteria and the availability of employment assistance programmes.

31. See *www.integrationindex.eu* for more information.

32. Large firms are defined as having more than 1 000 employees and small firms are defined as having between 10 and 49 employees.

33. The Veneto Region's government acknowledges these challenges in its Regional Territorial Plan of Co-ordination (*Piano Territoriale Regionale di Coordinamento*, PTRC), declaring, "The informal way that housing, manufacturing and services have expanded in the central area has constituted a process entailing extensive utilisation of space, a growing strain on territory as a resource, the deterioration of the outlying districts and congested mobility."

34. The most complete empirical work on sprawl, *The Costs of Sprawl – 2000*, applied scenarios based on estimates of uncontrolled sprawl and controlled sprawl (in which some sprawl was allowed, but overall, more compact, higher-density growth was demanded) for 15 economic areas in the United States. The five-year study found that sprawl could result in USD 227 billion in additional costs to the United States over a 25-year period (Burchell *et al.*, 2002). Researchers found that controlled growth could be achieved with only a 20% increase in density and a 10% increase in floor area ratio for non-residential uses. This produced large cost savings: Burchell's simulations estimated that a savings of 188 300 miles of local roads and USD 110 billion could be achieved by 2025 with more compact patterns, a reduction of 11.8% in state and local road costs. Water and sewer savings, though significant, were not as high; with compact growth patterns, the combined cost savings of lower tap-in fees and 4.6 million fewer lateral lines would offer infrastructure savings of USD 12.6 billion, or 6.6%, over 25 years (Burchell *et al.*, 2002).

35. Other policies include the regional development plan (*Piano Regionale di Sviluppo*, PRS), the economic and financial planning document (*Documento di Programmazione Economica e Finanziaria*, DPEF), the rural development plan (*Programma di Sviluppo Rurale*, PSR), the regional welfare plan (*Piano Socio-Sanitario Regionale*, PSSR), and the regional operating plan (*Piano Operativo Regionale*, POR).

36. The Article states: "The Republic consists of Municipalities, Provinces, Metropolitan Cities, Regions and the State. Municipalities, Provinces, Metropolitan Cities and Regions are autonomous entities with their own charters, powers and functions in accordance with the principles laid down by the Constitution."

37. The High Speed and High Capacity project has only been completed between Padua and Venice/Mestre. The preliminary project for the 80-kilometre section between Padua and Verona (to link the metropolitan area with Milan and Turin) was approved in 2006, but has not yet been financed. The section between Venice and Trieste has not yet been defined. The only route in the project that has been approved is the section linking Venice to Marco Polo airport. The part of the route that will connect the Venice airport with the airport of Ronchi dei Legionari (in Friuli-Venezia Giulia) and continue to Trieste is still in the preliminary assessment phase, and several ideas are under consideration.

38. The PTRC of Venice states,

> *Except for the suburban areas around Mestre, the other centres in the province are playing their part in the constitution of a polycentric system with its own relative autonomy whose relations are not concerned with a single metropolitan centre but with the polycentric Veneto network, already considered in the current PTRC, of the Padua-Treviso-Venice metropolitan area. When we speak of the central role in a region, we may think of a "polycentric urban district of metropolitan level" and local government systems. A central role that the area between Venice and Padua may assume in order to function in synergy with the inter-connected settled area, largely consisting of the central Venetian area. This responds to a great extent to a scenario in which, in this relatively densely populated metropolitan network, the specialised centres become the complementary centres of a multi-centre framework.*

39. The "green port" strategy aims to resolve the historical problem of the location of the oil terminal, either within or outside the Lagoon; energy efficiency of activities within the port, using any possibility of generating and/or stocking alternative energy sources; the improvement of the collection and recycling of rain water and of waste; the widening of both private and public green areas, accompanied by the planting of an adequate number of trees and other plants; the "zero emissions" target within the port, which needs to be achieved starting from the replacement of self-generated energy of passenger ships berthed at the Marittima with energy supplied from the shore, thus going beyond the "blue flag" agreement.

40. Local governments in the Venice city-region might consider the reduction or elimination of fees for new rental housing, streamlining the development approval process and reducing particular taxes for rental developments of moderate cost.

41. If the governments in the Venice metro-region were to go forward, the next step might consist in adopting Vancouver's strategy, which entailed *i*) a comprehensive analysis of housing demand and needs across the region; *ii*) the establishment of regional affordable housing targets by tenure, demographic categories, cost and income ranges; and *iii*) outlining possible regional implementation strategies (City of Vancouver, 2007).

42. Work conducted by DiPasquale and Wheaton (1994) provides an analytical framework for such a study, emphasising the multiple factors that influence housing prices.

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Chapter 3

Effective water governance: from instability to resilience

Faced with complex hydrological issues, including flooding, water supply security and water quality management, improved water governance could benefit economic development, historic conservation, and quality of life throughout the Venice city-region. This chapter both provides an overview of the main politico-hydrological challenges and proposes key recommendations for improving water governance. The first two sections outline the main water resources in the city-region and discuss the possible impacts of climate change. A series of incipient proposals for climate change adaptation will be evaluated. This is followed by an institutional mapping of what some observers call a "byzantine" structure of water governance, with multiple overlapping agencies and regulatory bodies from the Italian government, Veneto Region, provinces and municipalities. The second half of the chapter summarises key governance issues and "gaps" in the Venice city-region; e.g., *"gaps" pertaining to information, co-ordination, funding, capacity, administration and policy. It briefly discusses the consequences of these governance gaps, focusing on Lagoon flood protection and water quality management. The final section explores strategies for improving water governance and concludes with a set of suggested recommendations for urban water governance in the Venice city-region. These include recommendations pertaining to greater vertical and horizontal co-ordination (multi-level and integrated governance), long-term planning, and integration of broader ecological and economic development considerations into water governance.*

3.1. Water: a critical resource of the Venice city-region

Water symbolises the Venice city-region. For centuries, the city has depended on the Lagoon and its watershed as a mode of defence, means of transport, source of livelihoods (trade, fishing, etc.), a conduit for waste, and – more recently – tourist amenity. There are over 1 000 kilometres of seaways in the Venice city-region, and the Venice Lagoon represents a naturally dynamic ecosystem. The mainland hydrological system and the Lagoon have undergone centuries of intensive human modification and, until the twentieth century, this relationship was more or less in balance. Paradoxically, the water that once afforded Venice its power as a maritime empire now compromises its physical integrity. Periodic flooding threatens both the historic city and the mainland. Specifically, the increased frequency and severity of flooding is perceived by many as a threat not only to public health, but also to the liveability and economic viability of the historic centre. Floods have both short-term implications (reduced tourism-related income, increased costs of routine logistics) and long-term implications (notably damage to the city's building fabric and architectural heritage) for the Venice city-region.

Though the causes of flooding are complex, they are a symptom of poor water governance. At one level, the causes of flooding are straightforward. Simply put, some coastal and inland areas are already below mean sea level and therefore increasingly vulnerable to flooding. But the reasons for the increasing vulnerability are complex, and are related largely to human action at local and global scales. Floods derive, in part, from inadequate integration of the management of land use, water quality and water quantity at the watershed scale. Insufficient management of the dense hydrological network of rivers, tributaries and artificial canals exposes mainland areas to flooding. As outlined in Chapter 1, three key factors account for flooding in the Lagoon: subsidence; erosion, and chemical pollution; together, these have resulted in increased flooding of the historic centre and other islands exacerbated by the deterioration of the natural dissipative capacity of the Lagoon system.

As explored in Chapter 1, flooding in Venice's historic centre is only one of a set of water-related challenges facing the city-region, including flooding on the mainland, water supply security and water quality management. Significant flooding on the mainland in 2007 highlighted the issue of flood risk across the region, and raised the issue of potential weaknesses in the region's flood response framework, particularly in the light of current climate change models, which suggest future scenarios of extreme storm events of increased frequency and amplitude. Water quality (resources and drinking water) is an ongoing challenge, particularly in the Lagoon and in the southern part of the region. Although the region has relatively abundant water, degradation in water quality in some parts of the city-region, notably the south-west, is a problem, and has resulted in water stress in some areas; and high demand in some spots has negative ecological consequences, particularly on smaller rivers and streams.

Climate change will exacerbate urban water governance challenges, such as the protection of fresh and marine water quality, and flood management across the city-region. Of particular concern are climate-change-related increases in mean sea level, and increased frequency of extreme storm surges in the Adriatic, which are associated with the highest water levels in Venice. Although climate change is not the sole or even primary cause of flooding, it implies greater uncertainty and probability of catastrophic events, intensifying the challenges in water governance facing the city-region.

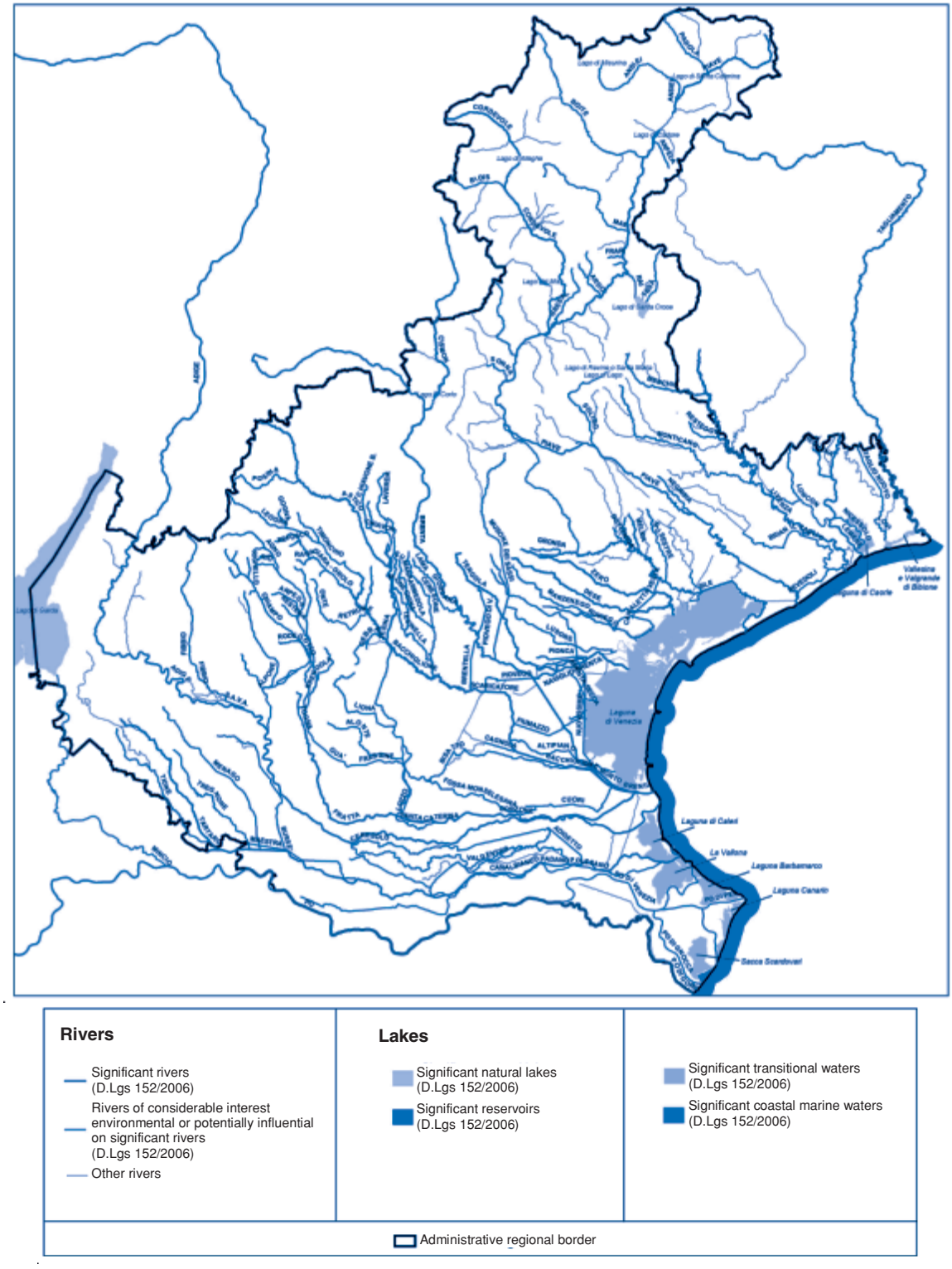
The intensive human manipulation of landscapes and hydroscapes through sprawling urbanisation (with a diffuse rather than nodal spatial pattern), and a high concentration of commercial and industrial activities inter-penetrated with agricultural zones, have intensified the demand for water. About 75% of this province is below mean sea level, which has serious implications for continuing urban expansion within the metropolitan area. The hydrological system has evolved and been modified through engineering interventions since the sixteenth century for the purposes of river navigation, flood control, Lagoon preservation, drinking water supply and irrigation of farm lands. The Lagoon, the historical centre of Venice, the inhabited islands, the drainage basin and the coast should be seen as inter-connected elements of a single system. This highly complex system, combined with the fragmented jurisdiction characterising environmental governance in Venice, poses significant challenges to developing effective flood response and water management mechanisms.

The delicate artificial hydrological network, composed of pumps, a 200-kilometre coastline, 1 000 kilometres of canals, rivers, reclaimed lands and dense urbanisation, requires constant and finely tuned management and maintenance. A considerable fraction of the basin surface is below mean sea level, and its reclaimed lands have to be artificially drained by pumping plants, sluices and other hydraulic infrastructure. A dense network of rivers, including the Po, Adige, Piave, Brenta, Bacchiglione, Livenza and Tagliamento, further complicate management (Figure 3.1). From a basin perspective, the Venice metropolitan region is crossed by eight drainage basins or parts thereof.[1] Consequently, the morphological features of the drainage system, combined with areas below mean sea level, and an enormous network of canals and tributaries, produce a complex mesh of hydraulic pathways, whose maintenance provides a constant challenge for local pumping stations and other water management entities.

Faced with these complex challenges, improved/more effective water governance could benefit multiple areas, starting with more comprehensive and integrated interventions for protecting the Lagoon system, which would guarantee the future of historic centre of Venice, the jewel in the crown of the metropolitan city-region. The tourism sector – both within the historic centre and the city-region – would benefit. A revitalised fishing industry within the Lagoon would be of obvious socio-economic and cultural value, and have the potential to generate additional tourism-related activity. Industry, particularly in the Marghera zone, but also small-scale "Third Italy"-type industries, would benefit if overall costs of water supply were to be reduced, particularly given the anticipated costs of the provision of water stemming from the high degree of water pollution in the south-west of the city-region.

This chapter both provides an overview of the main politico-hydrological challenges faced in the Venice city-region and proposes key recommendations for improving water governance. The first two sections outline the main water resources in the city-region and discuss the possible impacts of climate change. Within the climate change section, a series of incipient proposals for climate change adaptation will be evaluated. This is followed by an institutional mapping of what some observers call a "byzantine" structure of water governance, with multiple overlapping agencies and regulatory bodies from the Italian government, Veneto Region, provinces and municipalities. A description of the government agencies and research foundations engaged in protecting Venice and the Lagoon are provided in Annexes 3.A1 and 3.A2. The second half of the chapter summarises key governance issues and "gaps" in the Venice city-region, *e.g.* "gaps" pertaining to information, co-ordination, funding, capacity, administration and policy. It briefly discusses the consequences of these governance gaps, focusing on Lagoon flood

Figure 3.1. **Water bodies of Veneto**



Source: Courtesy of Agenzia Regionale per la Prevenzione e Protezione Ambientale del Veneto.

protection and water quality management. The final section explores strategies for improving water governance and concludes with a set of suggested recommendations for urban water governance in the Venice city-region. These include recommendations pertaining to greater vertical and horizontal co-ordination (multi-level and integrated governance), long-term planning; and integration of broader ecological and economic development considerations into water governance.

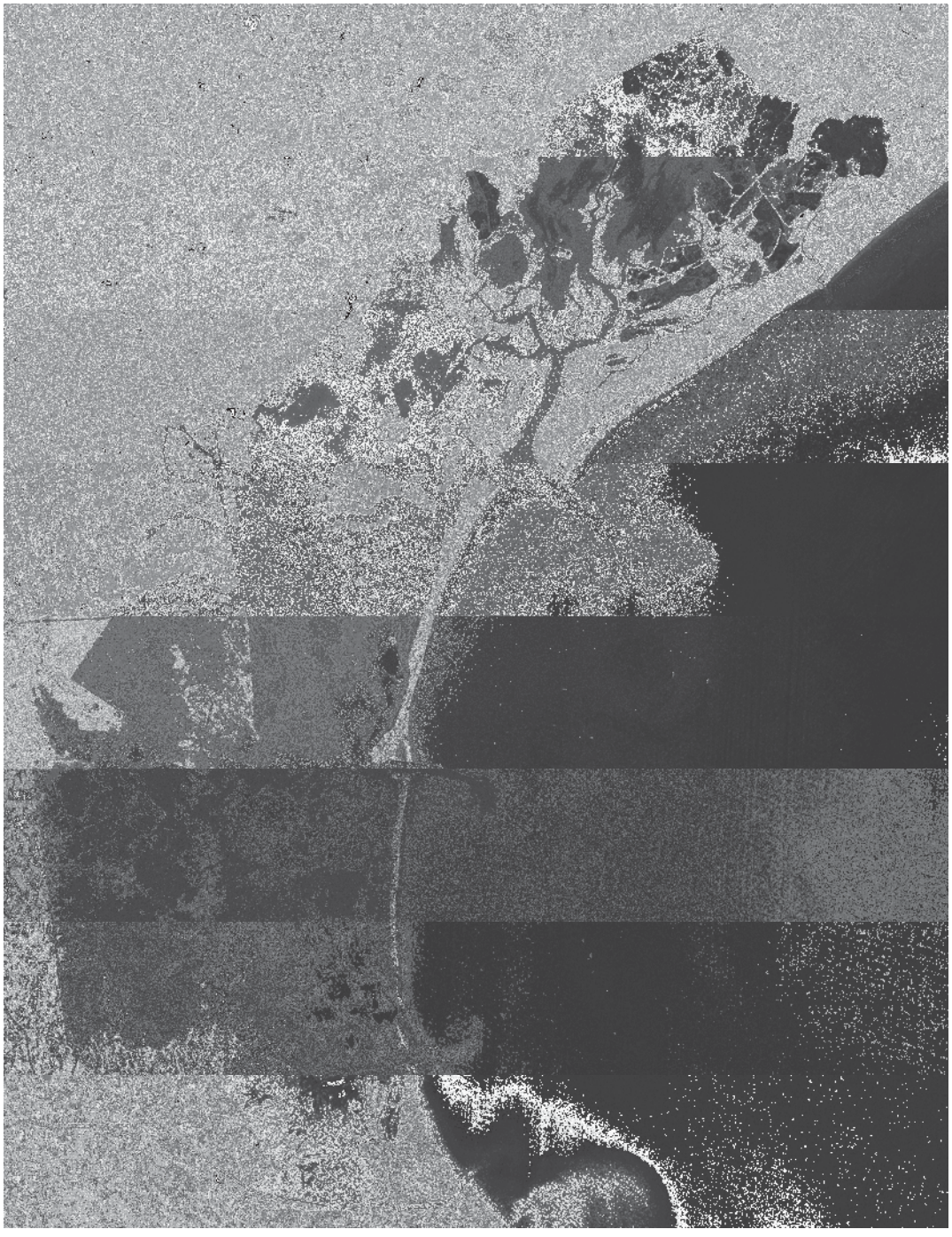
3.2. Water resources in the Venice city-region

The Venice Lagoon

To simplify, the successful and long-lasting relationship between humans and the transitional waters of the Venice Lagoon arises from inevitable interconnections between human activities and the ecosystem of the Lagoon. Deviation of the main rivers that used to flow into the Lagoon between the fifteenth and seventeenth centuries drastically changed the sediment budget of the Lagoon and ended the risk of it ever silting up altogether. The main human interventions over the past century have disturbed the pre-existing situation of the Lagoon, which was closer to a stable (albeit dynamic) equilibrium between land and marine forces. Principal changes include modification and stabilisation of the inlets via the construction of long jetties and outer sea walls, dredging of broader and deeper navigation channels to favour tanker, cruise ship and container traffic, land reclamation on marshy areas, and fish farm development through the closing off of vast areas of the Lagoon periphery to tidal excursion. These modifications intensified during the latter part of the twentieth century to support the growth of industrial activities in the Marghera area, whose legacy left contaminants, especially heavy metals and complex hydrocarbons, in the various layers of Lagoon sediment (Capodaglio *et al.*, 2005).

The main problems faced by the Lagoon system include subsidence, sea level rise, erosion, and chemical pollution. Human activities, especially industrial production in Marghera, which extracted large volumes of groundwater, have caused a further compaction of the soil. Sea level rise (eustasy), which has not yet been definitively associated with climate change processes for the region, has nonetheless been observed as about 10 centimetres during the past century for the entire north Adriatic, bringing the total loss in relative height for Venice relative to sea level to nearly 25 centimetres. The effects of subsidence and eustasy are exacerbated by continuing erosion, since the natural sediment supply to the Lagoon effectively ceased centuries ago, when the main rivers were diverted due to the threat of silt build-up. In recent decades, erosion of remaining salt marshes and intertidal areas has accelerated, due to stronger currents in the deep navigation channels and greater wave energy produced by wind acting upon deeper water bodies. Current salt marsh cover is one-third of what it was approximately 100 years ago, and the volume of water contained in the Lagoon has practically doubled, as the morphological substructures have been washed away by erosion (Bonometto, 2003). Chemical pollution has compromised water quality in the Lagoon: 70% of monitoring points in the Lagoon are classified as "bad" and nowhere is the water quality "sufficient" or "good" (Rusconi, 2007).[2] Nonetheless, the trophic state of Lagoon waters has generally improved over the past ten years.

Figure 3.2. **Map of the Venice Lagoon**



Source: NASA (2001), "Venice, Italy", *http://earthobservatory.nasa.gov/images/imagerecords/3000/3827/Venice_TAS2001347_lrg.jpg*, photo taken on 9 December. This picture of the Venice Lagoon was taken by ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer), an imaging instrument flying on Terra, a satellite part of NASA's Earth Observing System (EOS).

Box 3.1. **Geomorphological elements of the Venice Lagoon**

The Lagoon today is a flat, shallow water body of an average depth of approximately 1 metre, filling a total surface area of about 550 square kilometres, 50 kilometres long and 8 to 14 kilometres wide, and crossed by a network of tidal channels and mostly rectilinear navigation canals. Three inlets (Lido, Malamocco and Chioggia), 10 to 15 metres deep and 450 to 900 metres wide, connect the Lagoon and the northern Adriatic Sea. Average tidal excursion is between 80 centimetres and 30 centimetres (including spring and neap tide conditions) and water exchanges through the inlets demarcate three large-scale circulation patterns (north, central and southern Lagoon).

Underwater. Open waters and shallows, including the natural creeks and dug channels. The deeper navigation channels are marked out by distinctive trios of wooden stakes (*bricole*). Sea grasses grow in the shallows, helping to stabilise the Lagoon bed, and serve as a nursery for fish reproduction. The perimeter of the Lagoon is home to large fish farms (*valli da pesca*) representing almost a third of the total area and closed to tidal flows.

Mudflats (*velme* and *ghebbi*). Low-lying areas exposed only at low tide. They drain off the minor channels (tidal creeks) and influence salt marsh accretion and erosion processes. They are rich in invertebrate life (including clams, which are harvested and economically significant) and are important as feeding grounds for migrating waders, such as the redshank and sandwich tern.

Salt marshes (*barene*). Higher-level areas, partially covered with water only at high tide. They are irregularly distributed around the Lagoon and range in size from a few square metres to several hectares. They are important structures for attenuating the tides and currents within the Lagoon, and their salt-tolerant plant communities support a rich wildlife.

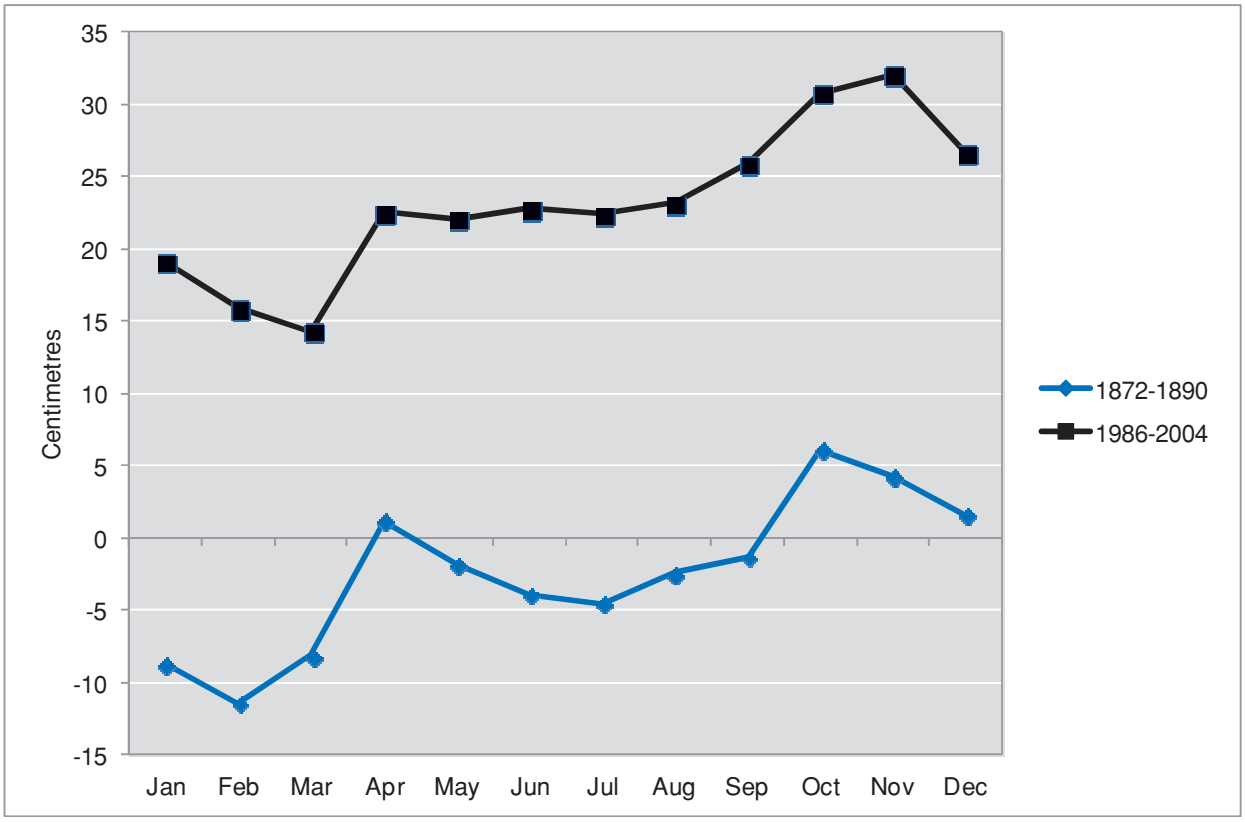
Islands. These areas are not normally affected by high tides: the islands (including Venice), islets and the three broad strips of land separating the Lagoon from the Adriatic (Pellestrina, Lido and Cavallino), fronted by sea walls, with openings to the sea at the inlets (*bocche di porto*).

Source: Fletcher, C. and J. Da Mosto (2004), *The Science of Saving Venice*, Umberto Allemandi & C., Turin.

Flooding in the Venice Lagoon is a well-documented phenomenon and is caused by the combined action of tides and storm surges that push greater volumes of water in through the inlets. Flooding in Venice has occurred with increasing frequency over the past century, as a result of human-induced subsidence, eustasy, and morphological changes in the Lagoon that have resulted in more water being exchanged between the Lagoon and sea, a reduced area for incoming waters to expand and reduced resistance from the Lagoon substructures to attenuate tide levels. Consequently more water comes into the Lagoon with each tide and storm surge. Average water levels are now almost 30 centimetres above nineteenth-century levels (Figure 3.3) and the frequency of high water events has increased by a factor of ten (Table 3.1). However, Venice will be defended against extreme and exceptional flooding once the mobile barriers (MOSE system) have been built at the inlets to the Lagoon. The organisation responsible for planning and building the barriers, the Consorzio Venezia Nuova (CVN), states that the system is designed to withstand a hypothetical average sea level rise of 0.6 metres and a tide of 3.0 meters.

The problem of chronic water damage and frequent moderate flooding remains. According to the most recent survey from INSULA and the Tide Forecasting Office, 14% of the historic city is flooded by the time water level reaches 110 centimetres.[3] Indeed, areas of historic Venice start to go underwater when water level approaches 90 centimetres. The probability that INSULA can raise pavements and reinforce banks by 2014 is highly improbable given recent budget cuts. INSULA calculated that it would need an average of EUR 43 million each year to complete extraordinary projects (dredging canals, raising pavements, etc.) and maintenance by 2030. In 2009 and 2010, the funding averaged EUR 16.85 million per year and has been falling since 2003, when INSULA was allocated EUR 55.7 million. To date, 66% of the pavements still wait to be redeveloped either for flood-proofing or to facilitate pedestrian traffic. Several projects, including those in Pellestrina Island, have since been postponed, and the scope of intervention of INSULA programmes has become limited to critical projects (INSULA Public Relations Office, 2009).

Figure 3.3. **Comparison of Venice's average monthly water level (cm) relative to tide**



Note: Water level in Venice is measured with reference to a zero that was defined in 1872, when the first mechanical instrument for measuring water level was installed at Punta della Salute, facing the open waters in front of Piazza San Marco. This zero level is now about 25 centimetres below average water level in the twenty-first century.

Source: Battistin D. and P. Canestrelli (2006), *La serie storica delle maree a Venezia*, Istituzione Centro Previsioni e Segnalazioni Maree, Comune di Venezia, October, Venice.

Table 3.1. **Average frequency of significant flooding events in Venice (by decade)**

1880-1919 and 1960-1999

Water level	1880-1919	1960-1999	2000-2009
>120 cm	0.75	13.25	20
>110 cm	2.5	33	52
>100 cm	7.25	82	141

Source: Battistin D. and P. Canestrelli (2006), *La serie storica delle maree a Venezia*, Istituzione Centro Previsioni e Segnalazioni Maree, Comune di Venezia, October, Venice; Istituzione Centro Previsioni e Segnalazioni Maree (2010), "Grafici e statistiche", *www.comune.venezia.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/2966,* Comune di Venezia, Venice.

The Venice Lagoon suffers from low water quality and high inputs of contamination. Organic pollution in run-off from agriculture and livestock production in the drainage basin, and the chemical effluents and emissions originating from the Port Marghera industrial zone are the main concerns. More recent studies have focused on the levels of heavy metals and concentrations of persistent pollutants such as dioxins, PCBs, DDT, aromatic hydrocarbons sequestered in Lagoon sediments (Zirino, 2005; Zonta *et al*., 2005). Both water and sediment pollution is widely distributed within the Lagoon, especially considering that sediments serve as a reservoir for pollutants, which then become re-suspended during activities such as mechanical clam harvesting or via erosion processes (associated with intensifying port traffic as well as the long-term morphological trend of the Lagoon) and other processes that influence the bio-availability of compounds which otherwise bind to the sediment particles. Lagoon sediment contamination has reached a point where most of the materials removed during periodic dredging to clear the channels and sea inlets are not considered fit for recycling within the Lagoon for morphological reconstructions. Occurrences of algal blooms, which are indicative of nitrogen and phosphorus imbalances, have sharply declined. Water quality, particularly near the city, is considered to be improving.

Metropolitan water supply

Water supply in the metropolitan area is highly fragmented geographically and separated by sector (urban, industrial and irrigation). The abundance of hydrological resources in the Veneto and their widespread distribution over the territory has often resulted in spontaneous organisation of the water supply into small and medium piped water networks. Groundwater reserves and surface waters constitute the water reservoir of the region and the metropolitan area in particular. The nature and the distribution of water extraction points vary according to the geomorphology of the region and include mountain springs, wells and surface waters, which are treated when necessary. Groundwater plays a major role, providing 90% of the water supply. Nevertheless, there are major differences in the water supply used by citizens of the metropolitan region. For example, Venetians mainly take water from deep aquifers in the mainland, while Paduans source their water from artesian and phreatic wells, as well as from some rivers and springs.

Potable water in the region is distributed by about 860 aqueducts that are more numerous in mountainous areas where the network is more fragmented, including some private wells. In 2007, only 8.5% of families in the Veneto reported having an irregular

supply of water. In the metropolitan area, networked water supply reached 100%, although the sewage network is not complete (Regione del Veneto, 2008c). The features of the water supply service include:

- Improving quality of water, especially after the establishment of Ambit Authorities (ATO) and integrated water services under the 1994 Galli Law.
- Extensive network leakage: Venice wasted more than 37% of its water in 2006 (Comune di Venezia, 2007). Though recent efforts have likely lowered this rate, improvements are still needed.
- In spite of significant increases in water tariffs over recent years, household water prices are still considered too low, and the issue of full cost recovery is still unresolved. To some extent, this reflects generic problems that affect the water supply sector in general. The water supply sector, insofar as it relies on hydraulic technologies, entails high capital costs relative to operating costs and to the tariffs generally charged for water. In addition, because drinking water is a non-substitutable resource essential for life, and because water resources are a vital input of industrialisation and modernisation, the financing regime has often become dependent on external inputs. Often, the full life-cycle accounting costs of replacing and maintaining water infrastructure and protecting environmental water quality have not been taken into account. A growing realisation of the insufficiency of funding has provoked active debate in Italy, as it has elsewhere, over the financing of the water sector and a re-examination of political commitments to the relative proportion of water financing sources, whether through taxes, tariffs, or transfers (OECD, 2009e).

In terms of water quality, the main issue is controlling diffuse sources of contamination by nitrates used in agriculture. Pollution of surface waters is an issue of great concern in the region, even if some positive trends have been reported. For the period 2002-2007, on a five-level scale evaluating surface water quality, the number of monitoring stations that registered bad quality water increased from 20% to 30%, and average quality from 29% to 39%. The upper Treviso plain has serious challenges, attributable to livestock, along with some areas of the lower Padua plains. The most critical situations include the Fratta-Gorzone River, beyond the metropolitan region, in the province of Vicenza, which contains high levels of chrome from leather-tanning industries, as well as some sections of rivers of the Venice Lagoon drainage basin and downstream, in Bacchiglione and Canal Bianco. Few stations can boast very good water quality (0.9% to 7.5%), and these are generally to be found in Alpine sections of rivers such as the Adige, Brenta and Piave and in some tributaries of the Bacchiglione basin.[4] The water quality of coastal waters has also seen positive trends, most likely due to a significant decrease in terrestrial loads of nitrogen and phosphorus, for example, via rivers.[5] This has been due to less contaminated runoff and increasingly stringent effluent regulations for industry and wastewater treatment plants.

3.3. The impact of climate change and the need for adaptation

Climate change impact and projections

Evidence of climate change and its associated impacts on hydrological cycles, including water security and flood risks, is now unequivocal, according to the latest IPCC Assessment (2007a).[6] Global average sea level has risen since 1961 at an average rate

of 1.8 millimetres/year, and since 1993, at a rate of 3.1 millimetres/year, with contributions from thermal expansion, melting glaciers and ice caps, and melting polar ice sheets. From 1900 to 2005, precipitation increased significantly in some areas of the globe, but declined in other areas, including the Mediterranean region. Globally, the area affected by drought has generally increased since the 1970s. Over the past 50 years, cold days, cold nights and frosts have become less frequent over most land areas, and hot days and hot nights have become more frequent. It is also evident that heat waves have become more frequent in most places and, since 1975, the incidence of extreme high sea levels has increased worldwide (IPCC, 2007a).

The Mediterranean basin is one of the areas most sensitive to climate change and, according to the IPCC, will register warming that is above the global average, increased frequency of heat waves and lower rainfall. The National Research Council's analysis of climate data for Italy for the past 200 years shows an increase in average temperature of 1.7°C relative to pre-industrial times, and an especially sharp change in the past 50 years (Ferrara *et al*., 2007). The 12 global climate models used in the IPCC Fourth Assessment Review indicated that for the Venice area, by 2100, alongside increased sea levels at the inlets, there will be: *i*) a 3° to 5°C increase in air temperature, *ii*) a 10% reduction in rainfall, and *iii*) an increase in solar insolation of the Lagoon. From an analysis of data from nine temperature stations and 49 rainfall meters provided by the Regional Agency for Prevention and Environmental Protection (ARPAV), the following temperature scenario emerges for Veneto for the past 50 years:

- significant negative trend in winter rainfall;
- significant temperature increase in every season, especially summer and winter maximums and summer minimums;
- changes in observed biological parameters like plant evapo-transpiration rates, which illustrates that biological adaptation is already under way;
- a correlation with reduced snow height and duration of snow cover.

Temperature rise and reduced rainfall will affect the Venice Lagoon through increases in salinity, nutrient concentrations and water temperature. Together with an unchecked rate of erosion of sediments from the Lagoon, which increases the volume of the body of water and makes residence times consequently longer, a series of negative feedbacks are possible in an already nutrient-rich system, resulting in algal blooms, eutrophication and ultimately foul-smelling waters and a further degradation of habitat.

Climate change will impact both quality and quantity of water resources, altering the water cycle as well as hydro-geological systems. For freshwater, this means changes in rainfall and snow cycles, water demand and the quality of water available – including temperature, nutrient concentrations, accelerated glacier melt, increased intensity and/or frequency of floods, drought periods and, above all, the occurrence of flash floods (IPCC, 2007b). The effects will be specific to individual catchment areas (watersheds) and the flood risk will depend on watershed conditions. Flooding can be the result of intense rainfall and/or the consequence of modifications to hydro-geological conditions in the mountain areas that feed into the catchment basin. More concentrated rainfall also affects the hydrological balance (lower infiltration of the water table, more run-off directly to the sea) and lowers the availability of water resources overall.

The most obvious issue for the coastal stretch of the metropolitan area, including the Venice Lagoon, is the increase in mean sea level. Average global sea level is expected to

increase by between 9 and 88 centimetres between 2070 and the end of the century. The regional forecast is more elusive, and finely tuned forecasts are not yet available. On the one hand, since the Mediterranean has registered stationary and even falling sea levels in recent decades, its take-up of global average sea level rise could be lower than in other places (Vergano *et al*., 2009). Increased evaporation with higher air temperature and lower volume of input from rivers has further increased salinity, which possibly impeded equalisation of water levels between the Mediterranean Sea and the Atlantic Ocean (via the Strait of Gibraltar). By 2100, it is expected that the surface temperature of the Adriatic Sea will increase by 2.5°C (MEDAR/MEDATLAS, 2002; Magnan *et al*., 2009). On the other hand, other studies that examine the effects of sea level rise in Antarctica and Greenland raise the possibility that sea level rise in the region could be at least double the latest IPCC forecasts. Increased instability and erosion of coastlines (especially in the upper Adriatic) has been documented by the National Agency for New Technologies, Energy and the Environment (Insula, 2000) and is further exacerbated by subsidence from natural and anthropic factors like natural gas and water extraction. In sum, the main climate change impacts foreseen for the upper Adriatic region centre upon:

- changes in tourist demand due to an increased ambient temperature for cultural, recreation and leisure activities in coastal zones (Venice, Mestre, Riviera del Brenta, Cavallino and Lido);
- reduced fishing productivity due to increased temperatures and changing ecological conditions;
- architectonic and structural damage to the urban fabric of Venice's historical centre, due to higher water levels and the effect of corrosive salts and humidity on building materials;
- extreme flooding events affecting economic and commercial activities in Venice's historical centre (Nunes *et al*., 2008);
- changes in the agricultural sector, *e.g.* optimisation of water management over the long term by promoting more winter crops (barley, winter wheat, durum wheat) in order to avoid the risks of high temperature and aridity, and selection of summer crops tolerant to water stress (*e.g.* sorghum, sunflowers).

An effective response to climate change? Measures and proposals for adaptation and mitigation

The European Green Paper on Climate Change and Adaptation (Commission of the European Communities, 2007) and the UN Framework Convention on Climate Change both place great emphasis on the concept of adaptation in the face of changes that are now considered inevitable. In helping to formulate adaptation strategies, the relative costs and benefits of different choices need to be known, as well as the cost of the damage expected to be caused by climate change and the extent to which an adaptation strategy can ameliorate such damage. The National Conference on Climate Change organised by the National Agency for Environmental Protection and Technical Services (APAT) in September 2007 aimed at setting out the basic elements for the definition of a clear national strategy for adaptation and setting up a planning process for the future (Carraro, 2008).[7]

However, there is at present no clear, finely tuned forecast of the nature and expected extent of climate change for the region,[8] nor is there an articulated characterisation of responses and how they should interrelate with each other. Perhaps it is unrealistic to

expect this type of strategic preparation before there is a better understanding of the likely impacts of climate change at the local level, although there is always a lingering hope that policy makers, even at the local level, will consider adopting the precautionary principle and work towards making their territories as safe as possible in the light of potential scenarios – not to mention promotion of greenhouse gas abatement measures, which are beyond the scope of this chapter.

Port-related economic considerations predominate, rather than the inevitable impacts of commercial and cruise ship traffic on erosion and the degradation of the Lagoon environment, even though the priority is ostensibly safeguarding the Lagoon. Meanwhile, the current inlet configuration, together with the dredged navigation channels for large ships, promotes erosion and net export of sediment to the sea. Estimates of the level of disturbance by incoming ships range from 8.7% to 32% and from 9.4% to 36.3% for outgoing port traffic. The associated costs are between EUR 16.3 million and EUR 27.2 million (Nunes *et al.*, 2008). Added to this is the longer-term cost of a reduction in the volume of port traffic once the mobile barriers become operative, as businesses choose a different port altogether in order to avoid the risk of arriving at Venice when the barriers may be closed. Reconsidering the viability of activities in the Lagoon that exacerbate erosion, notably the dredging of the rectilinear navigation channels to facilitate tanker, commercial and cruise ship port traffic could also prove costly.

Diffused measures

To date, Lagoon management has been weaker in the area of diffused measures, although the ecological health and integrity of the physical substructures demand urgent attention if the entire system is to be sustainable. It is still not clear what will be the main drivers of change and the potential changes to the physical system, economic consequences and strategic options. The approach is two-pronged:

- heavy engineering measures intended to override physical forces in the Lagoon; and
- restoring the degraded Lagoon system to its former state, when it was more productive, less like a bay open to the sea and more effective in modulating water levels.

Diffused measures, such as the restoration of salt marshes so they can gradually increase their height with rising water levels, are central to preserving Venice. Action needs to be taken to restore the natural dynamics of the Lagoon system so that it can have the capacity to respond to changes like sea level rise.

Sharply negative trends need to be moderated by measures besides MOSE to mitigate erosion, which leads to a net sediment loss from the Lagoon system at an estimated rate of one million cubic metres per year. Heated debate continues in the Venice scientific community about the extent to which modifications to restore the Lagoon system to an earlier conformation would sufficiently moderate exchanges with the sea and reduce overall water levels and flooding frequency. In response, proposed measures have ranged from reducing inlet depth and limiting the dredging of ships' navigation channels to restoring large areas of salt marshes in the Lagoon, which has been reduced by two-thirds since the beginning of the last century.[9] Additional salt marsh reconstruction projects are needed to apply appropriate techniques in context with the historical Lagoon configuration. According to a number of different studies, accounting for various

alternative combinations of measures, tide levels can be reduced by up to 20%. But in the case of an extreme event, such measures would have negligible influence over water levels, and flooding in Venice would nonetheless occur. These so-called "diffused" possibilities can only be considered as measures to contain everyday water levels in Venice and reduce the type of chronic damage caused by water levels that creep up the sides of buildings, infiltrate the plaster, stone and brickwork and then cause the building fabric to decompose, due to the crystallisation of the salt distributed by capillary action.

Regional climate trends and their effects on observed changes have not yet been established, due to lack of data. The absence of a regionally differentiated forecast of climate change makes it difficult for policy makers to understand the magnitude and direction of change for the Venice city-region. A competent information service is vital to safeguarding water resources and managing hydro-geological risks.

3.4. The institutional framework of water governance

Water management has been decentralised over the past 20 years. Water resources were managed by the Italian government until the passage of two key laws that distributed responsibilities for the water cycle and supply among all levels of administration: central government, regions, provinces and municipalities.[10/11] The central government is responsible for policy making and mainstream legislation, in line with national interests and European Directives. Issues related to the management of natural resources are divided between the Ministry of Infrastructure and Transportation, Ministry of the Environment, Ministry of Cultural Heritage and Ministry of Agriculture. The Ministry of Infrastructure and Transportation is responsible for the development and co-ordination of programmes related to major infrastructure (dams, aqueducts, water delivery network, sewage network, etc.), while the Ministry of the Environment co-ordinates water quality issues and related investment programmes. On the basis of discharge limits and penalties for infringement determined at the national level, the Provincial environmental protection department issues discharge permits and manages the environmental police service that deals with enforcement (monitoring, infringements and fines). Italian water policy legislation is now broadly in line with that of the rest of Europe, although enforcement is not always stringent. The Agriculture Ministry formulates policies in the area of crop production, forestry and fisheries, with special reference to food security. State agencies have the mandate to oversee these activities at a territorial level and also have responsibility for primary transformation of agricultural products, as defined by the European Community and adopted in national legislation in 1998. The Ministry of Culture has a determining role in safeguarding the architectural and artistic patrimony of Venice, including its landscape.

The Venice Lagoon

The multi-level governance framework governing the Venice Lagoon is often described as byzantine. Complicated, ambiguous and opaque, it includes problematic gaps and overlaps in the jurisdiction of the multiple public and private agencies involved.[12] After the 1966 floods in Venice, the Special Law of 1973 established that Venice is of pre-eminent national interest and gave the Italian government the authority to determine specific objectives and provide associated financing. The Special Law of 1973 was specifically intended to safeguard the environment (and its landscape, historical, archaeological and artistic features), protect the hydraulic and hydro-geological equilibrium, regulate the watercourses (natural and artificial) feeding into the Lagoon,

Table 3.2. **Administrative levels for water management in Italy**

Government level	Responsibilities for the water sector
Central	Co-ordination; planning; development of guidelines; implementation of European Directives; approval of regional plans; COVIRI (watchdog)
Regional	Formulation of regional water and environmental protection plans; monitoring of water resources; control of implementation of legislation; pollution control; data collection for surface and drinking waters; release of concessions on water use; collection of extraction fees.
Provincial	Inventory of discharges; permitting and enforcement; concessions for small water sources (*e.g.* wells), organisation of the integrated water system and its management (ATO).
Municipalities	Delivery of water supply and wastewater treatment services; permitting of discharges into sewer systems.

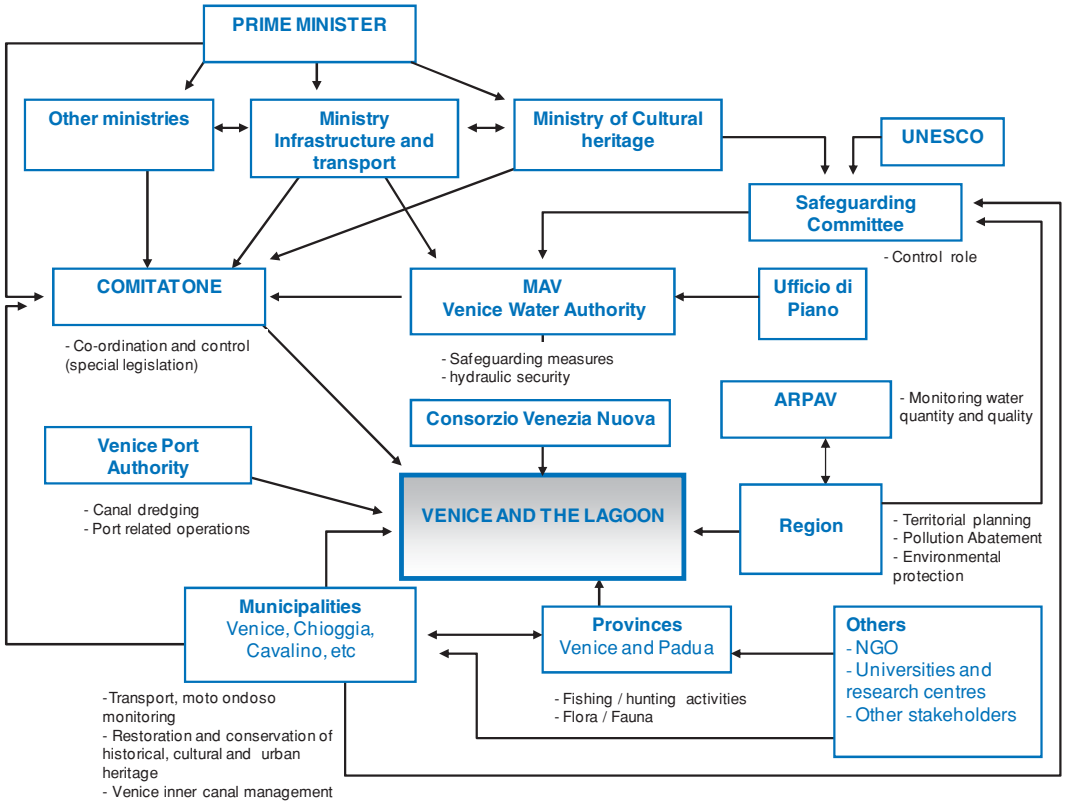
Source: Modified from Billi, A. *et al.* (2003), "Participatory Water Management and Cultural Heritage: Italy Country Report", *OPTIONS Méditerranéennes*, CIHEAM/MAIB, pp. 143-157.

and reduce and regulate tide levels, coastal defence works, and pollution protection works. The Special Law of 1973 assigned specific responsibilities for safeguarding Venice and the Lagoon among the various administrative levels:

- The Italian government has responsibility for the physical protection and restoration of the hydro-geological balance and water quality in the Lagoon. This responsibility is vested in the Venice Water Authority (*Magistrato alle Acque*, or MAV), originally founded in 1501, when Venice was a republic, but reconstituted latterly as a branch of the Public Works Ministry. MAV, in turn, delegates its operational functions via its executive agency, the Consorzio Venezia Nuova (see below).
- The Veneto Region is responsible for pollution control, especially with regard to inputs from the drainage basin.
- The municipalities of Venice and Chioggia at the southern end of the Lagoon are responsible for urban conservation and maintenance, as well as for promoting socio-economic development.

Since the 1980s, the Italian government has instituted some co-ordinating agencies to protect the Lagoon, within the terms of the Special Laws. These included a single operating agency, the Consorzio Venezia Nuova (CVN), which was to guarantee consistency in the interventions for safeguarding the Lagoon and is comprised of a group of Italian construction and engineering firms, all from the private sector. The 1984 iteration of the Special Law,[13] clarifying its predecessor, established the *Comitatone* (an interministerial committee presided over by the Prime Minister) to oversee the implementation of protection measures and budgetary allocations among the various strata of public administration and other institutions. In 1992, the Third Special Law required that the Veneto regional administration and the Venice and Chioggia municipalities be part of the *Comitatone*.[14] Ultimately, this has created overlapping and fragmented institutional responsibilities among various administrations and departments.

Figure 3.4. **Agencies and government entities responsible for protecting the Venice Lagoon**



Source: Da Mosto *et al.* (2009), *The Venice Report: Demography, Tourism, Financing and Change of Use of Buildings*, Cambridge University Press.

Between the last Special Law in 1992 and the early 2000s, Parliament set aside funds for safeguarding Venice in its annual budget, but since 2003, no provisions have been made for Venice in the national budget with reference to the Special Laws. Funding for the mobile barriers, however, has been arranged via the Strategic Objectives, a measure introduced by Prime Minister Silvio Berlusconi's government to stimulate the economy through funding of major infrastructure projects, such as high-speed rail links, motorway extensions and a bridge from the Italian mainland to Messina in Sicily. The Strategic Objectives measure specifically speeds up the execution of major interventions, and benefits from more rapid financing mechanisms through the Interministerial Committee for Economic Planning (CIPE), presided over by the Minister for Public Works/Infrastructure and Transport.

Metropolitan water governance and management

Administrative layers (national, regional, provincial and municipal) are increasingly distinct from the physical organisation of water resources protection and management, where functions are organised at the level of the drainage basin or sections of it. This has been especially true since the national government began devolving water management functions to the regions. This evolution has not been free of political influences, however,

and some of the boundaries of the substructures, notably the ATOs, do not perfectly correspond to hydrogeological features. Three institutional frameworks govern water in the Venice city region: *i*) watershed authorities, *ii*) ambit authorities, *iii*) and the Consortia for Land Reclamation and Irrigation (*Consorzi di Bonifica*).

Watershed authorities

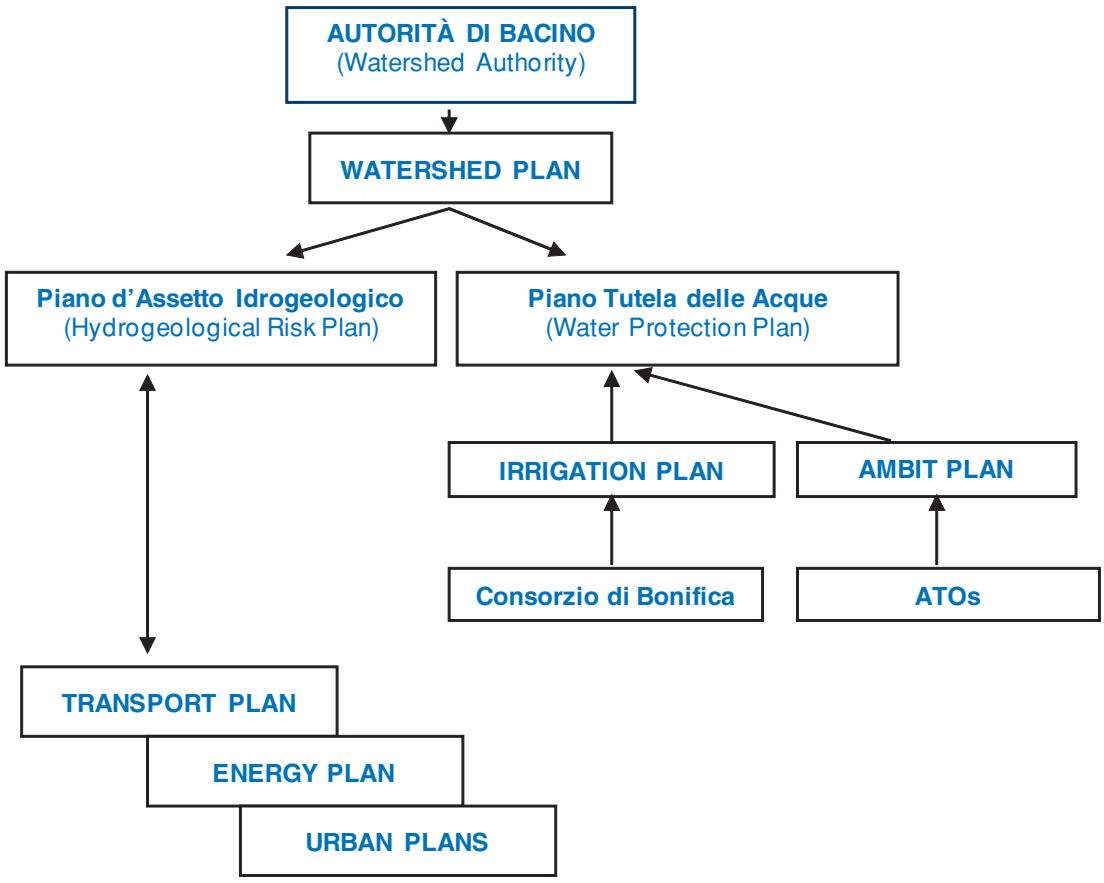
Central to water resource management and protection is the *Autorità di Bacino* (Watershed Authority) whose jurisdiction is mainly defined by hydrogeographic features on a watershed scale that may be sub-regional, regional, inter-regional, national and even trans-boundary. Italy has been subdivided into 36 watershed authorities, and the Veneto has 11 drainage basins that flow into the Adriatic Sea, which have been classified into three *Autorità di Bacino* of national significance, such as the Northern Adriatic Basin,[15] two inter-regional, and three regional watershed authorities or parts thereof (see Table 3.3).[16] The *Piano di Bacino* (Watershed Plan) is intended to be a dynamic tool, constantly updated in a feedback loop of implementation, management and monitoring. It is at the apex of the so-called hierarchy of planning instruments and regulates two areas critical to water resources: hydro-geological risks and water protection (quality and quantity). Only in the event of a natural catastrophe or state of emergency can the Italian government nominate a commissionaire with powers to override the prescriptions of the Watershed Plan, if necessary.[17]

Table 3.3. **River basins of the Veneto region**

Drainage basins of national relevance	1. Isonzo, Tagliamento, Livenza, Piave, Brenta-Bacchiglione (Northern Adriatic basin) 2. Adige 3. Po
Drainage basins of inter-regional relevance	1. Lemene 2. Fissero-Tartaro-Canalbianco Regional basin
Drainage basins of regional relevance	1. Sile 2. Plain between Piave and Livenza 3. Venice Lagoon

The main responsibility of a Watershed Authority is to draft the Watershed Plan (*Piano di Bacino*), the administrative and technical instrument that provides guidelines for structural and non-structural interventions on the territory. Formulated by the Watershed Authority, it sits at the apex of the planning pyramid (Figure 3.5). Ideally, it is also supposed to co-ordinate a large number of specific policies relating to hydraulic works, aqueducts, surface and groundwater protection and extractions. These include the Regional Water Clean-Up Plan (*Piano Regionale di Risanamento delle Acque*, PRRA),[18] the Water Protection Plan (*Piano di Tutela delle Acque*),[19] the Structural Model for Aqueducts of the Veneto Plan (*Modello Strutturale Acquedotti del Veneto*, MOSAV),[20] the Master Plan 2000 (*Piano Direttore 2000*),[21] and the Hydro-geological Watershed Plan (*Piano stralcio per l'Assetto Idrogeologico*, PAI).[22]

Figure 3.5. **Planning levels for water resources**



Ambit authorities

In 1994, the water and sewage sector was re-organised, in a move towards "integrated water services", intended to increase efficiency in the collection and treatment of wastewater and provide a rationalised water supply through a single water service. The reform, known as the Galli Law, organised water supply, sewage and water treatment services through the aggregation of municipal utilities into Optimal Territorial Areas (ATOs) governed jointly by provinces and municipalities.[23] ATOs are directly responsible for the management of water supply in each territory (*ambito*) and for setting tariffs at the municipal level. In particular, the ATOs oversee the merger of several water supply operators and implement the functional integration of the various parts of the water cycle into each *ambito*. The ambit authorities are expected to produce a strategic Master Plan to organise, implement and govern the integrated water service, particularly for the review of plants and services, investments and improvements in the services. The Veneto Region is divided into eight optimal management areas (ambit authorities or ATOs) together with the Inter-regional ATO Lemene. There are a total 92 of ATOs in Italy. The metropolitan area is mainly covered by five ATOs: western Veneto, Bacchiglione, Brenta, Venice Lagoon and Polesine.

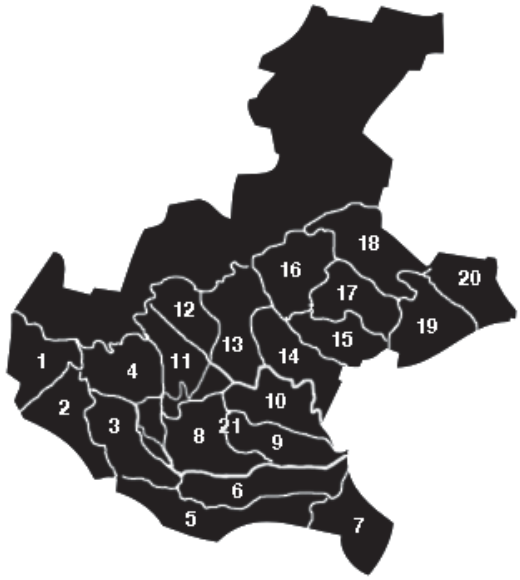
The Venice Lagoon ATO is of particular importance, as it includes most of the Venice Lagoon drainage basin. Established in 1998, it covers an area of about 1 266 square kilometres, and has a population of 638 031. The authority oversees all activities related to civil water services for 20 municipalities of the Venice Province and five municipalities of the Treviso Province, in an area that falls within the drainage basin of the Lagoon. The formation of the ATO has resulted in greater rationalisation of the management of water services. Though only four management companies now operate within this ATO, they average a network leakage rate of 37%.

Consortia for Land Reclamation and Irrigation

The Consortia for Land Reclamation and Irrigation (*Consorzi di Bonifica*) were created to improve and manage the hydraulic functions of rivers, canals and ditches of their respective territories, reducing flood risks where relevant. They also co-ordinate infrastructural works and monitor land reclamation activities carried out by landowners, and deal with soil conservation, erosion control, irrigation water supply and tariffs. Technically, the consortia are public bodies, and the territorial jurisdiction of each consortium is drawn up according to the hydraulic characteristics and irrigation networks in the area. They are administered directly by the landowners. Irrigation-related activities are managed collectively through local farmers' associations that do not have particular connections with urban and industrial water supply organisations. There are 21 of these agencies in the Veneto, which govern more than 68% of the region (ISTAT, 2002), or about 1.17 million hectares (Figure 3.6). They also manage the most important irrigation systems,[24] hydraulic infrastructures, river locks and pumping plants.

Figure 3.6. **Consortia for Land Reclamation and Irrigation in the Veneto Region**

01 Adige Garda
02 Agro Veronese T.T.
03 Valli Grandi e M.V.
04 Zerpano Adige Guà
05 Padana Polesana
06 Polesine Adige Cb.
07 Delta Po Adige
08 Euganeo
09 Adige Bacchiglione
10 Bacchiglione Brenta
11 Riviera Berica
12 Medio Astico Bacch.
13 Ped. Brenta
14 Sx Medio Brenta
15 Dese Sile
16 Ped. Brentella
17 Destra Piave
18 Ped. Sx Piave
19 Basso Piave
20 Pianura Veneta
21 L.E.B. Lessinio Euganeo Berico



3.5. Urban water governance in the Venice city-region: critical challenges

Given the myriad complexities of the interrelationships and impacts of Lagoon processes, and pressures onto the system due to human activity and global changes, a major review of policy options is urgently called for to establish priorities and avoid even more acute problems later.[25] This issue is central to discussions of the future of the Venice city-region, because water security is central not only to its economic competitiveness but to the survival of the historic city centre. The analysis has two objectives:

1. identification of key urban water governance challenges in the Venice city-region, with special reference to intergovernmental co-operation and public participation; and
2. recommendations for improved urban water governance, focusing on integration of governance and water policy making, and multi-level governance.

Key water governance "gaps" in the city-region, with particular attention to multi-level governance

Institutional fragmentation is a significant challenge, given that the governance and legislative framework for water in the Venice city-region is so complex. As previously noted, three scales of government – municipal, regional, and various national ministries and agencies – are active in water management, in addition to specific governmental agencies, including watershed authorities at two scales on the mainland, and several agencies in and around the Lagoon. In addition, as explored below, Venice has a number of additional, special-purpose authorities charged with activities relating to the port, the Lagoon, and the historic city centre. The legislative framework is equally complex, as Venice and its Lagoon are covered by the Special Laws (171/73, 798/84, and 139/92), which designate the city and its surroundings as a matter of national interest, and bring many aspects of funding and management directly under national government control. European Union legislation (notably the Water Framework Directive) adds another layer of legislative and administrative complexity. This multi-scalar governance framework has in some cases led to uncertainty, conflict and competition between agencies rather than metropolitan co-operation. Partly as a result, the management of urban water resources in Venice, as in many other cities, is characterised by significant governance gaps (Table 3.4).

Table 3.4. **Water governance gaps in the Venice city-region**

Information gap	Lack of research co-ordination, which compromises its usefulness for policy development; expertise from existing national research bodies is not effectively integrated into governmental policy processes; and lack of systematic information-sharing between relevant agencies has resulted in a lack of integration of the best available scientific/technical information into policy, and has also resulted in a lack of baseline data that could inform an integrated long-term vision.	*Example: Water quality standards in the Venetian Lagoon* Water quality standards for the lagoon flow from those determined at the EU level. But there are important instances, as suggested by scientific research, where these standards are ill-adapted to the Lagoon's ecosystem. For example, assessments of water quality in the Lagoon carried out according to current regulatory norms do not reflect the latest knowledge in biochemical speciation, nor integrate the best available scientific information about the biochemistry of the Lagoon's waters. As a result, "breaches" of water quality norms do not always accurately reflect the quality of the water. This is the case, for example, where naturally occurring "background" levels of some elements (*e.g.* cadmium) exceed EU thresholds and yet tend to be biochemically inert, because they are bound up with organic matter.

Table 3.4. **Water governance gaps in the Venice city-region** (*cont.*)

Capacity gap	Management capacity within individual agencies is relatively strong. But co-ordination capacity (horizontal or vertical) is relatively weak.	*Example: Fragmented water quality management at the watershed scale* Each municipality is responsible for water supply and wastewater treatment, under the auspices of the region (which governs the allocation of water to bulk water suppliers from which municipal utilities obtain water). The region is responsible for monitoring water quality in areas upstream from the Lagoon, whereas discharges and enforcement (including fines/penalties) are the responsibility of the provinces. Water quality monitoring in the Lagoon, on the other hand, is carried out by a combination of central government, regional and municipal agencies. In this context, the link between upstream and downstream impacts, and co-ordination of effective monitoring and enforcement, is attenuated.
Funding gap	Unstable or insufficient revenues discourage sustainable investment and undermine co-ordinated governance.	*Example: Fluctuations in funding for Lagoon flood protection year by year* The largest portion of funding for water-related investment in the region is controlled by the *Comitatone (see description in Box 3.2)*, a national-level body. Funding that it provides for Lagoon protection has fluctuated significantly from year to year (with, for example, no monies earmarked at all in 2003 and 2004). Moreover, some observers argue that the disbursement of funds has been skewed towards flood protection against extreme events (such as the controversial MOSE project), neglecting other conservation measures, *i.e.* restoration of the Lagoon's natural flood-buffering capability through the reconstruction of salt marshes with ecological features comparable to the original salt marshes.
Administrative gap	A geographical mismatch exists between hydrological and geopolitical/ administrative boundaries.	*Example: Fragmented governance of the Venice Lagoon's watershed* The land draining into the Venice Lagoon covers an area of over 2 000 square kilometres, is administered by 100 municipalities (*comunes)*, and lies within two provinces. The Veneto region covers the Lagoon watershed, and also partially extends into two other watersheds. No single agency is responsible for overseeing or co-ordinating water resources or water quality management within the Lagoon watershed, and differences of opinion frequently arise between the different authorities.
Policy gap	Horizontal fragmentation of water-related tasks amongst government ministries and agencies hinders integrated policy development.	*Example: Lack of consideration of water management in land use planning* Although the Veneto Region governs water quality, municipalities ultimately govern land use planning, resulting in a lack of comprehensive governance of the impact of land use on water at the watershed level. This hinders the development of integrated policies governing the combination of land use and water management issues. Of particular concern is the fact that Watershed Plans drawn up by relevant watershed authorities are not fully reflected or respected in land development decisions.

It is important to note that Venice's situation is not unique. Italy faces many challenges to its water sector, as demonstrated by the relative time it has taken to meet EU requirements for water quality (OECD, 2002). Under-pricing of water supply is prevalent throughout Italy, and utilities are consequently unable to cover their full costs (including the environmental costs) in the absence of central government subsidies (this is also true internationally; see OECD 2009e). A lack of data (particularly historical time-series) is also evident in many regions, and regional governments and watershed

authorities do not always co-ordinate their activities. Though the governance gaps are not unique to water issues or to the city of Venice, the magnitude of the threats facing Venice could have acute effects and consequences.

Consequences of water governance gaps

The governance gaps explored in the previous section affect all water-related management issues within the city-region. They translate into three primary characteristics (or "symptoms") of weak water governance in the city-region: insufficient intergovernmental co-ordination; a short-term focus; and a lack of sufficient integration of ecological issues into policy making. These three points are illustrated, below, through a discussion of two of the Venice city-region's most pressing water-related issues: flood protection within the watershed and water quality management in the city-region.

Example of governance "gaps": insufficient flood protection within the Venice city-region watershed

The Venice city-region is hindered by the lack of integrated flood prevention and emergency response planning outside the historic centre. This is in part due to the fact that the governance framework is highly fragmented, with multiple actors responsible for various aspects of Lagoon and flood management and relatively weak intergovernmental co-ordination. Four agencies (governmental bodies) at four different scales have responsibility for flood protection within the Lagoon (focused on the historic centre of Venice and inhabited islands). Strategic co-ordination of the implementation of all measures to protect Venice and its Lagoon is the responsibility of the *Comitatone* (the "Large Committee", created in 1984 under the provisions of the Second Special Law). Importantly, the *Comitatone* allocates the budget provided by the national government to given national ministries (Box 3.2).

Box 3.2. **The responsibilities of the Comitatone over the Venice Lagoon**

The second Special Law (1984) instituted a mixed committee of government ministers and local authorities, known as the *Comitatone* (Large Committee). It decides strategy, co-ordination and control of the implementation of all measures to safeguard Venice and the Lagoon, and especially how to divide the budget. The committee is chaired by the President of the Council of Ministers (the Italian prime minister) and consists of the heads of five ministries, their executive branches and the various local administrations, including the President of the Venice Water Authority (Secretary), the Minister for Infrastructure and Transport, the Minister of the Environment, the Minister of Cultural Heritage, the Minister of Transport and Navigation, the Minister of Universities and Scientific and Technological Research, the President of the Veneto Region, the Mayor of Venice, the Mayor of Chioggia and two representatives of the many other local authorities bordering the Lagoon. The budget for financing of measures designed to meet objectives of the Special Laws is allocated by the national government on an *ad hoc* basis.

Despite the creation of the Institute for Environmental Protection and Research (*Istituto superiore per la protezione e la ricerca ambientale*, ISPRA) in 2008, institutional fragmentation on flood forecasting and response remains a concern. The responsibility for flood-response falls to the municipalities.[26] Under the auspices of

ISPRA, the National Agency for Environmental Protection and Technical Services runs the Hydrographic Office (with a network of 52 tide gauge stations) that systematically measures tide levels across the Lagoon.[27] Municipalities in the city-region do not have the same organisational flood response mechanisms as Venice (that is, a central office with flood forecasting and emergency response staff and integrated emergency response plans). Under the Water Framework Directive, a single district authority for the area between the Adige River catchment and the Isonzo, including the Venice Lagoon, should emerge as foreseen by law (152/2006). However, this has not yet been implemented and so fragmented water management has continued. In sum, the Venice city-region has not approached long-term, integrated flood mitigation and response planning as systematically as other regions at similar risk, notably the Netherlands, which not only practises flood-risk control in terms of physical defences and engineering operations, but reserves areas of the city for periodic inundation by limiting urban development in such areas.

Example of governance gaps: overlaps in water quality governance in the Venice city-region

The management of water quality in the Venice city-region illustrates the implications of governance gaps discussed above.[28] Permitting and monitoring functions are shared between several agencies. As explored below, the division of responsibilities for water quality between the Lagoon and the upstream watershed exemplify the structural disincentives at play in intergovernmental co-operation at the regional scale.

- The majority of water quality standards are set at the European level, then adopted in national and subsequently regional legislation.
- Discharges of pollutants on the mainland are controlled in part by the Province of Venice, which organises solid waste disposal, controls pollution (by issuing discharge permits for effluents and emissions) and runs the environmental police department.
- Monitoring of fresh water quality on the mainland is the responsibility of the Region (through the Regional Agency for Prevention and Environmental Protection, or ARPAV).
- Wastewater treatment and sewage discharges are managed by municipalities (which in turn follow plans and guidelines developed by the region), who have delegated this function to an inter-communal, publicly owned company, VERITAS. Water supply coverage is at 100%, but wastewater treatment (sewage) coverage is only at 70%, with a notable lack of sewerage networks in the historic centre of Venice and rural areas in the Venice city-region.
- The Venice Water Authority (MAV) monitors Lagoon water quality through its Anti-Pollution Service.
- The Venice Port Authority has responsibility for maintaining the canals in the Marghera industrial zone, which has been a significant source of industrial pollutants in the Lagoon ecosystem.

The allocation of water quality control, monitoring and enforcement functions between different agencies has compromised co-ordination of water quality management within the Lagoon watershed, in particular because of the separation between "upstream"

and "downstream" functions. This is significant, given a history of pollution, ranging from untreated sewage in the historic centre of Venice to discharges of mercury, dioxins and hydrocarbons from industrial areas bordering the Lagoon (notably the Marghera industrial zone), and upstream agricultural run-off.

Significant improvements in water quality governance have been realised on the mainland over the past decade and consequently in the Lagoon. The Venice city-region region, relative to other regions in Italy, now has a robust monitoring system. Political will has increased with respect to enforcement of and compliance with water quality controls (particularly on the part of industry). Factories have been closed within the region in recent years, for example, because of their inability to comply with environmental quality standards. In several key groundwater protection zones, land use planning controls have been implemented as a means of protecting subsurface water (although the degree to which these plans are successfully enforced, and "variations" to the controls are approved, remains to be seen). In short, improvements can still be made, but the governance framework in place for controlling industrial point source pollution has shown improvement in the past few decades.

The question of diffuse sources of pollution, notably from agricultural and urban activities, requires systematic attention. In particular, the lack of integration between land use and water management is obvious in the lack of systematic attention to water issues in urban planning. Urban planning (and responsibility for land use, with its implications for water use) within the watershed is undertaken by both the provinces and the municipalities. The effective integration of land and water management issues is hampered by the fact that, although the Province of Venice has the administrative responsibility for residential and industrial development on much of the coast, it does not control "upstream" land use, which also affects water quality in the Lagoon and in coastal waters, and it does not control the main urban areas of the Lagoon (the responsibility of the municipalities). In theory, all plans are required to refer to the Watershed Plan, but compliance with and interpretation of these plans is often weak.

The *acqua alta* poses human health risks. Sewage in the historic centre is untreated, and flows directly into the Lagoon, which receives an organic and pathogen loading equivalent to a city of more than 400 000 persons during the tourist season. The sewage issue in historic Venice has been scrutinised by the OECD in its earlier work (1991). Significant levels of hepatitis A and enteroviruses have been detected in Venice's canals. Swimming in the canals is forbidden, but multiple exposure routes exist, including flooding, and aerosol contamination due to disturbances of water by boats (Rose *et al.*, 2006). Remedial measures have been taken: for example, since the late 1990s, private residences (as well as hotels and restaurants) have been obliged to install septic tanks. Their extent remains limited, however, and can only have a limited impact on overall Lagoon water quality, which is also affected by pollutant inputs from upstream and the Adriatic Sea.

Regional planning processes could improve co-ordination on water-related issues. For example, the most recent regional urban plans, the Regional Development Plan and its subsidiary Territorial Co-ordination Plan (which were intended to encourage the densification and rationalisation of the urban fabric and improve mobility) do not systematically address water, either in terms of quality or in terms of the volume consumed. In the case of water supply (and hydrological budgeting functions, or *bilancio idrico,* in particular), responsibility has been shifted from the central government to the

regions within the past decade. The region has a basin management plan (*piano di bacino*) but it is not effectively integrated with other planning instruments.

Besides a plan which limits discharge in the watershed (Piano Direttore 2000), the Lagoon does not have a long-term water quality management plan. This is particularly urgent given the Lagoon's highly polluted sediment, which is at times sufficiently polluted to be designated as toxic waste under national legislation (and thus subject to special removal and disposal procedures). The Lagoon sediment is nonetheless an important resource for morphological reconstruction (*e.g.* salt marshes) and littoral regeneration (*e.g.* creation of parks along the coastal zone). However, no integrated policy governs water quality concerns stemming from dredging for navigation purposes, which stirs up sediment and re-introduces it into the water column. Though measures, such as the Fusina Waste Water Treatment Plant, will improve the sediment and water quality issues, consideration for water quality could be mainstreamed in planning processes at the watershed scale throughout Veneto. Without a far-reaching water quality approach, the availability of potable water may be compromised. For example, the integrated regional water supply network now under construction was deemed necessary because of the poor surface water quality in the southern part of the region. The new morphological plan of the Lagoon, which is perennially being debated, will play a fundamental role in influencing water quality in the future.

3.6. Strategies and tools for improving water governance

The preceding section discussed "gaps" in governance in the Venice city-region, and pointed out some of their consequences. This section focuses on strategies that could be useful in improving urban water governance in the Venice city-region, focusing on three themes:

- greater vertical and horizontal co-ordination;
- long-term planning; and
- the integration of water and broader ecological considerations into policy, from the municipal up to the regional scale.

These issues are of course not unique to the Venice city-region, and are typical of urban water governance in many parts of the world. Nonetheless, given the central economic and cultural role that water plays in Venice, these issues are of critical importance in the city-region and correspond to the governance gaps identified in Table 3.4.

Addressing the "capacity gap": improving co-ordination

The need to improve co-ordination is generalised across the Venice city-region, at all scales. Decentralised governance is associated with the region's diffuse system of economic production and the Italian tradition of strong municipal governance. From one perspective, diffuse governance has advantages, permitting responsiveness to the needs of local economic "clusters" whose innovation, flexibility and capacity to buffer external economic shocks are commonly considered to contribute to the region's economic success. But diffuse governance also has disadvantages, such as difficulty dealing with cross-cutting issues and "public goods" including health, transport and the environment (including water). Indeed, in the Venice city-region, diffuse governance is typically

associated with a degree of competition or a lack of co-ordination at different scales. This stems from both structural (*e.g.* overlaps or gaps in responsibilities) and political factors (*e.g.* contestation between different political parties at different scales of elected government). In the context of poorly defined responsibilities for water-related issues, diffuse governance hinders integrated environmental management, both horizontal and vertically, and has particularly acute impacts in the water sector, given that water is a flow resource subject to multiple and at times, conflicting uses. What strategies might be useful in this regard? With respect to water, this section considers three sets of strategies: multi-level governance (vertical co-ordination) and integrated water governance (horizontal co-ordination); new business models; and improving consultation and participation in water governance.

Water supply could be improved with improved intra-regional co-ordination and the creation of an integrated governance structure. This is likely to entail significant benefits across the region, including economies of scale, greater efficiencies in procurement and provision, and improved compliance with sector standards. The co-ordination of water supply provision across the Venice city-region demonstrates the links between vertical co-ordination (or multi-level governance) and horizontal co-ordination. Indeed, in the case of water supply, horizontal co-ordination (or integrated governance) is critical. The case of VERITAS (Box 3.3) provides an example of successful co-ordination.

Addressing the "administrative gap": integrated governance at the watershed scale

In recent years, a new interest has arisen in integrated water management. There are important arguments in favour of (and drivers for) co-ordination facilitated by rescaling of governance, together with horizontal co-ordination and rationalisation of government services. A variety of suggestions have been made relating to the mechanisms by which this might be implemented, particularly over the implementation of the EU-mandated "watershed agency", and the creation of a metropolitan city-region covering the Venice-Padua-Treviso urban agglomeration, which could be assigned water-related functions. To what extent could such measures improve integrated governance?

The water governance system could be more effectively mobilised. For example, although it has existed for over a decade, a watershed management plan by the Sile *Autorità di Bacino* has yet to be approved. In practice, the role of the *Autorità di Bacino* has been largely limited to approving and suggesting modifications to water-related plans at the regional level. The barriers to integrated watershed governance are largely political, given the delicacy of transferring powers between agencies and levels of government. This is particularly complicated in the Venice city-region, given the separation between the Lagoon and the watershed, as far as legislative issues, management and funding are concerned. Compliance with EU legislation is not yet a significant factor, and vested interests in the region have not so far been willing to push for integrated governance.

Integrated watershed governance is the most effective way of achieving water security for the Venice city-region over the long-term. The benefits of watershed-based planning, which are best achieved in the context of integrated watershed governance, are well-known, as illustrated by the example of New York City's water supply system (Box 3.4). But as with many environmental issues, no single, powerful constituency represents the interests of the "watershed". The creation of the water districts or (*distretti idrografici)* may be a step in this direction.

Box 3.3. **Water supply management within the Venice city-region: an example of successful multi-level governance**

Over the past decade, as required by the "Galli Law" of 1994, the water supply sector has been rationalised across Italy, including within the Venice city-region (see Danesi *et al.,* 2007, for a discussion of the policy and legislative background). In the context of rapid economic development and urban growth beginning in the 1970s, local water supply networks had grown in a localised fashion, resulting in 328 water supply utilities for the regional population (which is now nearing 5 million). Water supply network coverage reached 100% (although sewerage connection coverage is lower, at 70%, largely due to a lack of sewerage connections in rural areas).

The water supply system in the Venice city-region has been successfully rationalised and integrated at a regional scale. After consolidation, the number of water supply utilities (water "providers") now stands at 18 municipal water "agencies" (joint stock companies) that share the ownership of water distribution and wastewater networks. Simultaneously, the "bulk" water supply system has been consolidated: the four previous water suppliers were consolidated in 2007 into a single corporation (VERITAS), which is owned by 25 municipalities (owners of various aspects of the bulk water distribution network), and acts as a bulk water supplier on a contractual basis to the 18 municipal water providers. The current contract is in place until 2018.

Concurrently, the regulatory framework has evolved. Water supply continues to be governed by national laws and associated regional laws and policies; in particular, the region, province, and public health authorities continue to monitor water quality. In addition, a new body has been created (under the auspices of the Water Management Law of 1998): the Ambit Authority (*Ambito Territoriale Ottimale*, ATO), which co-ordinates bulk water supply. The ATO, which is made up of the 25 municipal owners of the bulk water supply network, plays a regulatory role: it sets fees for water services, and also determines contractually based incentive payments and fines for meeting or breaching water quality standards/environmental standards by VERITAS. This situation, which is in compliance with current EU legislation, may have aspects of a "poacher-gamekeeper" regulatory problem, insofar the regulators are also the owners of the company. But there are also advantages in the current situation, such as a close exchange of information between the municipalities and the supplier, and economies of scale and scope arising from synergies in planning multi-utility investments.

Rationalisation of the water supply sector has occurred in many countries over the past several decades. But usually this process is "top-down". The Venice case is interesting because of the degree to which the process was "bottom-up": municipalities were a central driver in the consolidation process. They were motivated by concerns about new water-sector requirements imposed at the national level (flowing from new EU legislation) concerning water quality and water sector consolidation. Informally, the desire for consolidation and creating water providers of a "critical mass" gained currency because it would make it possible to compete in a sector which is likely to be opened up to competition from private water supply companies. In this context, the drive to scale up operations, improve performance and increase efficiency was seen both as a defensive and a cautionary measure.

The successful consolidation of municipal activity shows the ongoing benefits of co-ordination across the metropolitan city-region. VERITAS has standardised operating systems and accounting procedures, and is developing an integrated regional water supply network to make it possible to replace the poor-quality surface water being used for drinking water in the southern zone by higher-quality water from the northern part of the city-region. When it is completed, the regional water-supply network will be a good, if rare, example of integrated, co-ordinated infrastructure network operating across the entire city-region.

Box 3.4. **The benefits of watershed-based planning for urban water supply: the case of New York City**

In many jurisdictions around the world, watershed-based planning is being adopted with the goal of ensuring water security, defined as "sustainable access on a watershed basis to adequate quantities of water, of acceptable quality, for human and environmental uses" (Program on Water Governance, 2009). This definition implies that there must be access to adequate quantities of water of acceptable quality for both humans and the environment, on a continuous basis. The World Economic Forum recently described water security as "the gossamer that links together the web of food, energy, climate, economic growth and human security challenges that the world economy faces over the next two decades" (World Economic Forum 2009).

Watershed-based planning is essential to achieving water security. This is because water (as a flow resource) does not respect jurisdictions: upstream activities affect downstream communities, and different (and competing) uses affect each other. The integration and balance of these uses and users requires a watershed approach.

The benefits of this approach can be seen in the case of New York City's water supply system. The city has the largest unfiltered water supply system in the world, and its reservoir system extends nearly 200 kilometres north of the city limits, within the Catskill/Delaware and Croton watersheds, supplying water to the 8 million residents of the city.

Watershed (or "source") protection is a key element of the city's water governance strategy. The city has a Department of Environmental Protection, which administers a comprehensive watershed programme, including protective (or pro-active) and corrective (or reactive) measures. For example, the city has invested more than USD 300 million to buy upstate land around the reservoirs, in order to improve source water quality and eliminate the need for building expensive water quality treatment plants. And the city partners with farmers and other land users incorporate water-quality friendly strategies into their land use practices.

As a result, New York has some of the cleanest and least expensive drinking water in the world.

Source: City of New York Department of Environmental Protection (2009), *www.nyc.gov/html/dep*.

Addressing the "policy gap": Adopting new business models and consultative water governance

The Venice city-region has already instituted a large number of new business models and should be supported in its efforts to rescale governance and co-ordination. Both joint stock companies for water supply distribution and the establishment of a publicly owned water corporation re-scaled water supply governance up to the regional scale (Table 3.5). This suggests that successful co-ordination *and* successful re-scaling of urban water governance can be facilitated by the introduction of new business models.

Table 3.5. **Water management in the Venice city-region**

Business model	Example in Venice city-region
Government utility – direct management	Municipal water supply utilities (until 2007, see below)
Government stand-alone agency	AATO (local government agency); eight exist in the Veneto region.
Government-owned corporation	New joint stock companies for inter-municipal water supply within the city-region (since 2007)
Users co-operative or consortium	*Consorzio di Bonifica*
National agency	*Magistrato alle Acque* (local branch of the Ministry of Public Works) Agency for Environmental Protection and Research (*Istituto Superiore per la Protezione e la Ricerca Ambientale*, or *ISPRA*), established in 2008 and the product of the merger of several government agencies overseen by the Ministry for the Environment
Delegated management	Since 2007, delegation of water supply functions to VERITAS, a corporation owned by a consortium of 25 municipalities. Note that this is a delegation to a *government*-owned corporation, and not a private corporation.
Private utility	None

A good fit between governance models and business models in the Venice city-region would be optimal. The previous governance framework for water supply distribution (dispersed, un-co-ordinated) was not appropriate, for example, for the introduction of delegated water management models. Consolidation of governance through the creation of AATO, a supra-municipal co-ordinating body has, however, enabled the delegation of bulk water services provision to an external provider (in this case, the publicly owned VERITAS). This solution appears to make possible improvements in performance and sourcing of necessary funds while effectively providing an integrated public services network. Other new business models, such as VERITAS (Box 3.3), are also signs of innovative thinking in the water sector. But, as outlined in the previous section, weak governance hinders effective articulation of these new bodies, particularly with respect to management at the watershed scale.

Although the region is developing some examples of extended consultation on policy processes, relatively few examples exist in the city-region of delegated and consultative governance. Diffuse governance arguably creates barriers to participation by ordinary citizens within regional processes. When participation does occur, consultation tends to focus on officially recognised organisations, associations, and trade bodies, and other established stakeholders. There are few examples of participatory processes in water governance in the Venice city-region. This is not surprising, since North American approaches to conflict management and dialogue through the planning process are not typical in Italy. Nevertheless, at the local level it is still not clearly appreciated what the value added of participation can be in the water sector.[29]

Addressing the "information gap": Developing a long-term vision

The lack of attention to long-term strategic planning impinges upon water governance. Diffuse governance, in the absence of protocols for decision-making on issues affecting the region (and in the absence of any metropolitan city-region scale of government with broad-ranging powers) implies that stalemates over controversial issues such as infrastructure are likely to arise. The long lead times for the construction of large-scale infrastructure projects, such as the Mestre Bypass or MOSE, are thus symptoms of a lack of co-ordination, in which issues do not get resolved until they become emergencies. This is the case for water as well as other issues.

The absence of an online source for historical data on water resources and quality compromises water governance. This occurs despite the large amount of data and scientific research produced within the region. ARPAV (the Regional Agency for

Environmental Protection of the Veneto), which plays a central role in monitoring functions, does not monitor all water-related variables (most importantly, those related to the Lagoon), and does not have a data repository function beyond the information that this organisation specifically collects. The closure of the network of State Hydrographic Offices during the regionalisation of water-related functions (following the Galli Law of 1994), and the failure (to date) to replace this network with the planned "single information system" for water resources in Italy has created a significant gap in the availability of information. Historical information, especially, is fundamental to determining the condition of the resources, understanding processes of change and identifying trends.

The third key issue with respect to long-term planning pertains to monitoring and evaluation of water-related goals in urban planning. Within urban planning processes at the municipal level, water is not addressed as a specific sub-sector. This is not only true at the municipal scale. The *Regione Veneto* does have a water quality plan, but it pertains solely to drinking water quality and wastewater treatment, restricted to municipal water utilities. At the regional scale, broader environmental issues are taken into account through the application of standardised environmental assessment criteria and measurement through indicators associated with plans. But no corresponding benchmarks exist with which to evaluate fresh water quantity or quality (this is symptomatic of a general lack of benchmarking within municipal urban plans).[30] In other words, the lack of integration of water resource and quality benchmarking within urban planning processes makes it difficult to effectively integrate considerations of land and water use. The use of performance indicators is increasing across Europe, however, which suggests that important lessons from water sectors in other countries (and from other sectors in Italy) could be of assistance here (OECD, 2009f).

Better information would also play an important role in establishing a more complete picture of the economic costs and benefits of current and proposed water governance strategies and environmental measures. Currently, for example, many of the costs associated with the ecological and morphological degradation of the Lagoon are "externalised"; in other words, these costs are not borne by those who contribute to the damage, like speed boats or industrial polluters. The costs of insurance against increased flood risk are another example of the externalisation of costs. In these cases, costs are increased for the tourism sector and shops, offices and facilities exposed to flooding. But other sectors, such as fishing and agriculture, also bear costs, due, for example, to the negative impact of morphological changes and water pollution. To give just one example, the traditional Lagoon fishery (in existence since records began to be kept) was largely abandoned in the 1980s, a period during which fishing in the Lagoon became largely untenable due to environmental factors. Its replacement by a monocultural clam fishery has, in turn, had additional impacts on the Lagoon ecosystem (notably through disturbance to the Lagoon bed) and on the Lagoon's flood-buffering capacity (Silvestri *et al.*, 2006).

No governance mechanisms are at present in place to deal with the impact of poor water management on economic development. It would be useful, for example, to require adequate information to effectively assess costs and benefits, and to link this information to optimise management strategies (for example, to impose the internalisation of costs through "polluter pays" approaches). More broadly, many sectors might benefit from governance mechanisms focused on linking water management and economic development. Of course, because this implies that various costs would be borne by

different actors and sectors, the selection of an appropriately inclusive "good governance" model would be crucial for such a strategy to succeed.

3.7. Recommendations for improved urban water governance in the Venice city-region

In analysing the serious water governance-related challenges faced by the Venice city-region, this report has focused on the underlying governance gaps. These have resulted in three key weaknesses: insufficient intergovernmental co-ordination; a short-term focus; and insufficient integration of ecological issues in policy making. Simply put, current water governance frameworks in the Venice city-region do not assess water-related threats in an integrated fashion and are poorly equipped to respond in a co-ordinated way. These weaknesses are inter-related; for example, a partial consequence of poor co-ordination between these bodies is the absence of integrated long-term planning for the city-region as a whole. The following recommendations seek to inform the debate on water governance debate in the Venice city-region, to help provide effective solutions to protect it from flooding and improve water quality.

Improving integrated watershed-based planning

Many of the required elements (such as watershed plans) already exist in the city-region's water governance structure, but some are not sufficiently operationalised or implemented. It would appear timely for the watershed plans developed by the *Autorità di Bacino* to be effectively implemented. In doing so, consideration might be given to developing protocols for the integration of the Watershed Plan with regional and municipal development planning processes (in particular, the Regional Development Plan and the Territorial Co-ordination Plan); with particular reference to the need to prioritise the development and comprehensive implementation of watershed plans, including the integration of land use planning processes with watershed security requirements. Ontario (Canada) offers an insightful example of how land use planning processes are being integrated with watershed planning processes, under its Source Protection legislation, which mandates the creation of Source Water Protection Committees throughout the province. The Venice city-region might consider the development of a centralised online water data repository, in order to pool critical historic data and facilitate integrated planning. This is particularly important for medium- and long-term planning for adaptation and mitigation responses to climate change.

These watershed plans should be closely articulated with the planned creation of water districts[31] for the region, in conformity with the EU's Water Framework Directive. These offer an important opportunity for creating a single management unit for the Lagoon and its watershed in its entirety.

Using water policy to pursue economic objectives and "smart growth"

The implementation of existing mechanisms for integrated water and land use planning would improve water governance. In theory, these mechanisms exist, and water quality and quantity concerns should play a role in guiding land use decisions. In practice, however, this approach is not systematically applied. Regional strategies for limiting the "ecological footprint" of supply chains (*i.e.*, limiting water use, controlling water quality, and spatial planning strategies that limit impacts on water resources) could be better developed. This would imply, for example, considering the water-related synergies associated with urban densification and industrial clustering (*e.g.* industrial zones where

complementary production processes foster water re-use). Last but not least, attention should be paid to a critical examination at a strategic level of current policy priorities (*e.g.* expanding the port and infrastructural investments focused on the mobile barriers), and a critical assessment of how the various economic development threads and infrastructural investments to safeguard Venice impact upon each other, as well as protecting Venice from the impacts of climate change, including sea level rise. This analysis could be conducted by an independent third party. In particular, consideration should be given to the question of dedicating greater attention, financial resources and political prioritisation to the support of the ecological functions of the Lagoon, which plays such an important role in buffering water levels, mitigating water quality and supporting livelihoods (this last element is a neglected potential of the Lagoon system).

Joint urban planning and water governance aimed at reducing sprawl would be effective in promoting density. In theory, the instruments exist for achieving this recommendation, notably the Watershed Plans, and their effective implementation should thus be a key goal. For example, urban planning frameworks could include protocols in which water security considerations (both in terms of quality and quantity) might impose constraints upon land use (*e.g.* site location for industrial and commercial facilities; in-stream flow needs for watercourses). This would require the operationalisation of new planning processes with respect to water (and indeed other environmental issues) at the municipal level, and a tighter integration between regional and municipal planning processes.

The inclusion of watershed-related issues within economic development strategies at the regional and sub-regional scale may reveal important and hitherto under-exploited opportunities. For example, riverways provide potential opportunities for tourism at the local scale, particularly on the mainland. This suggests that the treatment of rivers as multi-use landscape features (as tourist attractions, amenities for local residents, transport links and ecological functions such as water purification and flood attenuation) could usefully be integrated into economic development strategies. Focus on the revitalisation of islands in the Venice Lagoon, many of which are uninhabited, could offer additional opportunities.

Achieving multi-level co-ordination of water policy

The second set of recommendations pertains to regulatory institutions and tools that could contribute to improving multi-level co-ordination of water policy making in the Venice metro-region. First, detailed analysis should be conducted of the policy objectives of the *Special Laws* in their various iterations, to determine *i*) the degree to which original objectives have been met; and *ii*) whether they are still valid for overall safeguarding of the Lagoon and Venice.

The creation of a Venice Water Forum, analogous to the Innovation and Competitiveness Forum, might benefit the water sector. This would be a neutral venue for dialogue and co-ordination, and might be useful in raising public awareness and participation if its proceedings were open to the public. It might also be useful in developing strategies to minimise or eliminate the frictions that exist between different actors in water governance in the city-region. The Water Forum could complement multi-stakeholder "learning networks" on water in the region (including but extending beyond the Lagoon). Note that this is not a suggestion for a new co-ordinating structure, but rather a novel approach to co-ordinating and improving decision-making amongst existing players. The goal would be to promote a more objective debate on safeguarding

measures and strategic choices for development of the region, based on scientific understanding, open consideration of all available and emerging technological capabilities and an integrated, articulated long-term perspective.

Greater support for strategies for inter-municipal co-ordination of water-related planning functions could enhance multi-level water governance. This might begin with voluntary and informal networking: for example, a regionally sponsored process providing incentives for the creation of inter-municipal sub-watershed networks organised on a hydrological basis, *e.g.* tributaries of the Sile. These networks could potentially be critical in scaling up land use functions to the sub-watershed scale, which is important for addressing water quality and land use considerations such as sediment and chemical loading into surface water sources.

The city-region could capitalise on the important lessons learnt through experimentation with business models for water governance that have been ongoing in the region over the past few years. A synthetic study of experiences with business models, with a mandate to examine those that best support integrated watershed management, would be appropriate. It is relevant to note here that each business model has costs and benefits, and that a broad range of variables (including the cost of regulatory and oversight requirements, accountability and management synergies) need to be considered in addition to financial issues. The scenario whereby infrastructure investment planning is led on a project-financing basis, and ease of financing becomes the over-riding criterion, should however be avoided.

Envisioning long-term strategies for water governance in the city-region

A long-term vision, integrated at the watershed scale, appears to be lacking in the Venice city-region, but could assist both with optimising planning outcomes and, in some cases, reducing long-term costs. Around the world, many communities (following models developed through international processes such as Agenda 21) have developed a "sustainable community vision", which in turn provides guidance to communities on policy making, including preferred water management goals and strategies. A common "vision" strategy could be one means of reducing the fragmentation of governance of the watershed of the Venetian Lagoon. This is particularly the case with respect to broader ecological issues: in this regard, greater attention in ecological restoration (bringing potential benefits of reducing water quality and flood mitigation expenses elsewhere in the watershed) could be merited. A long-term visioning exercise should take into account lessons learned from international examples in city-regions facing similar issues; for example, London's visioning exercise for the Thames and the "comparing futures" initiative in the San Joaquin-Sacramento Delta (Public Policy Institute of California, 2007, 2008).

A shared, long-term vision is urgently required with respect to regional flood response strategies. The development of an integrated region-wide flood management response plan, as well as flood risk reduction measures, should be a priority for the regional government. This implies increased attention to flood risks on the mainland, which need to be integrated with flood risks within the historic city centre. In turn, this would generate increased political legitimacy for the full suite of precautionary approaches to protecting both the environment and Venice's historical heritage, and a better appreciation for the full range of costs and benefits associated with such measures.

Notes

1. These include the Venice Lagoon drainage basin, Sile, Pianura between Livenza e Piave Adige, Lemene, Livenza, Piave, Fissero Tartaro Canalbianco, and Brenta-Bacchiglione (including Fratta-Gorzone).

2. Of pollutant loads (direct and indirect), 64% are attributed to inputs from rivers of the drainage basin, 13% to Marghera, 6% to the historic centre and other inhabited islands, 4% o the Campalto water treatment plant and 13% to atmospheric deposition. Phosphates, nitrates and ammonia-based compounds are the main contaminants, along with metals.

3. See *http://gisportal.insula.it/moduli/quote2/* for an interactive map of the affected areas in historic Venice.

4. The entire Sile River, central Piave and mountainous Livenza and Brenta are generally considered good quality.

5. The TRIX trophic index is the standard applied to marine coastal waters. Numerically, the TRIX index is scaled from two to eight, covering a range of four trophic states. Between 2003 and 2007, ARPAV reported a positive trend, with an increase in the number of samples corresponding to good-quality conditions (TRIX <5) along the Veneto coastline.

6. The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Review formally defined climate change as a reality, declaring: "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level." (IPCC, 2007a).

7. The first attempt at applying cost-benefit analysis to forecasts was carried out by the National Agency for New Technologies, Energy and the Environment (ENEA), and it emerged that the most vulnerable economic sectors in Italy are agriculture, tourism, industry, insurance, health (all of which are important to the metropolitan area) and the most vulnerable areas, in terms of geography and local economy, are coastal areas, mountain regions and the south of the peninsula, because of the region's reliance on agriculture (AAAV *et al*., 2003).

8. This is due to straightforward scientific uncertainty, partly because of low research spending in the area of climate change studies.

9. Proposals include:

   - Re-opening the fish farm areas on the Lagoon periphery to tidal exchanges (this is equivalent to nearly 20% of the total area of the Lagoon.
   - Altering the inlet configuration to reduce the cross-section and also the orientation of the jetties and outer sea walls, to increase the Lagoon's resistance to waters being pushed into the Lagoon by the sea and prevailing winds. (Such measures are incompatible with the barrier construction, which is already underway.)

- Reducing the depth of the principal ships' navigation canals and controlling the speed of traffic in the rest of the Lagoon to reduce sediment re-suspension which is then carried out to sea by the tide and current.
- Restoring the surface area of the Lagoon occupied by salt marshes. This area has shrunk dramatically, to about one-third of its extent at the beginning of the last century. Important for water quality and other ecological functions, including the conservation of biodiversity, this kind of morphological diversity slows down the throughflow of waters and helps to reduce tidal excursion, as well as rounding off the peaks of water levels during surges.
- Improving effectiveness of the Lagoon police force in halting the illegal clam harvesters who use mechanical systems to collect clams. This churns up the Lagoon bottom, allowing more sediment to be washed away and also irreversibly damaging the Lagoon bed, killing sea grasses that would otherwise help anchor sediment particles. Water quality is another cause of sea grass loss.

10. These two laws include the Land Use Law (1989) and the Galli Law (1994) on water resources.

11. The first comprehensive water legislation, following World War II, was not passed until 1976. Known as the "Merli" Law on Water Pollution Control, it defined maximum effluent standards for industrial and municipal discharges. In 1982, the first legislation dealing specifically with drinking water was passed, following the European Directive on the subject.

12. In contrast, during Venice's time as a republic (1607–1797), laws for the Lagoon and mainland domains were carefully drafted and vigilantly applied. This attention dwindled from the nineteenth century onwards, and the Lagoon's defining characteristics and underlying dynamics have altered significantly as a result.

13. Another iteration of the Special Law in 1984 committed the Italian government to re-establish the hydro-geological equilibrium of the Lagoon, invert the process of degradation, and protect the urban settlements from exceptionally high tides.

14. It calls for the *Comitatone* to adjust and reinforce the long breakwaters at the three Lagoon inlets, provide local defences from high waters for built areas, restore Lagoon morphology, halt the process of the Lagoon's deterioration, build coastal defences, substitute petrol tanker traffic in the Lagoon with a pipeline to a sea terminal, and open up the closed acquaculture (*valli da pesca*) areas to tidal expansion.

15. The basin is of national importance and includes 620 municipalities, covering an area of 20 000 square kilometres, with a resident population of about 3 million. The extreme hydro-geological dynamics of these basins are well-known: they have the highest rainfall levels in Italy and flood flow rates can reach 5 000 cubic metres in the Tagliamento and in the Piave and 3 000 cubic metres in the Livenza and Brenta rivers.

16. Six national watershed authorities cover about 45% of the country in spatial terms. The remaining 55% of the country is within the remit of 17 regional authorities, 11 inter-regional authorities and 1 pilot project (Serchio). For management purposes, smaller river basins are grouped together under a single watershed authority.

17. After the flooding of Mestre in September 2007, a Commissionaire was appointed who is still serving at the time of writing. Commissionaires are normally appointed for periods of 6 to 12 months, essentially the duration of an emergency, but there are

instances where the position has been repeatedly extended, creating a "chronic state of emergency".

18. This is a sector plan that primarily regulates water treatment and sewage systems. The plan has been the main regional instrument for water protection and pollution prevention for many years but is due to be substituted by the Water Protection Plan.

19. The Water Preservation Plan is the regional instrument with environmental quality targets (water quality and quantity parameters) as regards surface and coastal waters, and for guaranteeing a sustainable water supply in the long term. It was approved by the Regional Council on 5 November 2009. It aims to reach the quality goals specified in Articles 76 and 77 of Legislative Decree n.152/2006.

20. MOSAV is a special plan adopted by the Region in 2000 (following a 1998 provision aimed at providing adequate and safe drinking water service throughout the Veneto) involving the creation of a single aqueduct/supply network and co-ordination of the eight regional ATO authorities.

21. This defines specific environmental quality objectives for the Venice Lagoon, including a schedule of works and the associated financial requirements. An important position is occupied by the Fusina Integrated Project, a new and innovative treatment system that reduces pollution and promotes the re-use of waste water (Casarin *et al.*, 2005).

22. This is an essential component of the Watershed Plan, whereby the Watershed Authority (inter-regional, regional or sub-regional): *i*) defines the water budget by evaluating water supply and water demand; *ii*) specifies the minimum flow required for supporting dependent ecosystems; and *iii*) drafts flood and landslide risk and hazard maps. The PAI is the administrative and technical tool by which the Watershed Authority operationally manages the territory specifically as regards flood and landslide risk exposure. In 2007, the Veneto Regional Council adopted the PAI for the watersheds of the Sile and the *pianura* between the Piave and Livenza rivers.

23. A national committee for monitoring water resource use, the *Comitato per la Vigilanza sull'Uso delle Risorse Idriche* (COVIRI), reports directly to the Italian Parliament and oversees implementation of water management services in each region.

24. The Consortia irrigation fees have been extremely modest for a long time, with unsustainable consequences for water resources. More realistic water tariffs in the agricultural sector have been gradually introduced over the past decade (Billi *et al.*, 2003).

25. Flood protection measures adopted on the mainland, which include increasing the pumping capacity from river tributaries into the Lagoon, which could operate during the same storm conditions that necessitate closure of the mobile barriers could change the overall water level in the Lagoon and flood risk in the historic centre under conditions of an extreme weather event, in which heavy and persistent rains are coupled with a strong storm surge.

26. Specifically, the City of Venice runs the Tidal Forecasting and Early Warning Centre (together with a monitoring network of 11 stations), and is in charge of the city's flood response protocol.

27. Measuring tide levels, however, is distinct from flood warning which is dependent more on weather and wind data. The Town Council Tide Forecasting Office currently

performs this task and operate the sirens and messaging service. It is still undecided which agency will be in charge of this system once MOSE is functional.

28. Hydraulic works and watersheds are covered by a series of plans. The Regional Water Clean-up Plan (*Piano Regionale di Risanamento delle Acque*, PRRA) is a sector plan that primarily regulates water treatment and sewage systems. It has been the main regional instrument for water protection and pollution prevention for many years but is due to be substituted by the Water Protection Plan. The Water Protection Plan (*Piano di Tutela delle Acque*) is the regional instrument that establishes environmental quality targets (water quality and quantity parameters) for surface and coastal waters, and for guaranteeing a sustainable water supply in the long term. Lastly, there is the Watershed Plan explored above.

29. The possible advantages of participation in water governance include: *i*) access to "local" expertise that can improve the quality of decision making; *ii*) the ability to adapt regulatory programmes to meet local conditions; *iii*) empowerment of stakeholders, particularly those who have traditionally been marginalised; *iv*) reinforcement of social trust between stakeholders, and reduction of conflict over competing uses; *v*) greater co-operation in information-sharing; *vi*) greater legitimacy (and thus enforceability) of water management planning outcomes; and *vii*) buy-in and support of influential interests. The possible disadvantages include: *i*) a focus on local environmental interests to the exclusion of regional or national environmental concerns; *ii*) the risk that an emphasis on consensus may lead to deadlock or to politically workable rather than environmentally optimal solutions; *iii*) unequal representation of stakeholders at the local level; *iv*) the undermining of long-term sustainability by the amount of volunteer time required ("burnout"); *v*) greater overall costs, and more time required to produce outcomes, such as water use or watershed plans; and *vi*) a lack of clear evidence of positive impact on water quality or quantity.

30. This is a significant oversight, which may become more important in the future, given the degree that water-related landscape features may play a central role in economic diversification and the diffusion of tourism activities across the region (for example, promoting the River Sile and its environs as a tourist destination).

31. As per Decreto Legislativo 152-2006.

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Annex 3.A1

The institutional framework for governing Venice and the Lagoon

- ***Commissione di Salvaguardia* – the Commission to Safeguard Venice**

  Instituted by the First Special Law, this committee has the power to block proposed interventions and must approve projects on all construction sites as well as land use transformations and modifications planned by private and public bodies anywhere within the Venice Lagoon boundary. It has about 20 members, including UNESCO and the National Research Council (CNR), presided over by the President of the Region. To some extent it overlaps with the Town Council's land use planning remit, and it has been accused of causing bureaucratic delays. Its decision-making parameters are dominated by aesthetic rather than technical considerations.

- ***Comitatone***

  The second Special Law (1984) instituted a mixed committee of government ministers and local authorities known as the Comitatone (Large Committee). It decides strategy, co-ordination and control of the implementation of all measures to safeguard Venice and the Lagoon, especially how to divide the budget. The committee is chaired by the President of the Council of Ministers (the Italian Prime Minister) and consists of the heads of five ministries, their executive branches and the various local administrations, including the President of the Venice Water Authority (Secretary), the Minister for Infrastructure and Transport, the Minister of the Environment, the Minister of Cultural Heritage, the Minister of Transport and Navigation, the Minister of Universities and Scientific and Technological Research, the President of the Veneto Region, the Mayor of Venice, the Mayor of Chioggia and two representatives of the many other local authorities bordering the lagoon.

- ***Magistrato alle Acque* (MAV) – Venice Water Authority**

  The Venice Water Authority is a technical agency of the Ministry for Infrastructure and Transport with direct and primary responsibility for the safeguarding, security and hydraulic protection of a large area spread across a number of regions (Veneto, Friuli and Lombardy). It was established in 1907, but its name dates back to an organ of the Venetian Republic of the same name, founded in 1501.

  MAV duties cover five national river catchments (Adige, Brenta-Bacchiglione, Piave, Livenza, Tagliamento), one international catchment area (Isonzo) and the lagoons of Venice, Marano and Grado. With regard to the Venice Lagoon, MAV carries out systematic monitoring activities and oversees the planning and execution of safeguarding measures via Consorzio Venezia Nuova, its executive agency. A few

technical offices have remained within MAV, notably the Anti-pollution Service, which publishes a monthly digest of lagoon water quality according to a series of physical-chemical characteristics at five monitoring stations.

- ***Consorzio Venezia Nuova*** **(CVN)**

  The Consorzio Venezia Nuova is the executive agency of the Ministry for Infrastructure and Transport-Venice Water Authority responsible for planning and implementing the measures to protect Venice and its lagoon, delegated by the law to the State.

  The second Special Law established that a single body could take on responsibility for the interventions as a whole, on behalf of and controlled by the Venice Water Authority, and on the basis of a general plan of interventions defined and approved by the Comitatone (and therefore by the institutions represented on the committee) and by Parliament. Hence CVN is required to prepare and implement an "integrated plan" to tackle the various aspects of the physical and environmental protection of the Lagoon ecosystem in a coherent and organic fashion and with a systematic approach.

  Measures to monitor and improve the quality of water and sediment in the Lagoon – most recently known as the MELa Programmes 1 and 2 – are also the responsibility of the government and are carried out by CVN, in collaboration with the Regione, the Veneto Regional Agency for Environmental Protection (ARPAV) and university research departments.

- ***Regione Veneto*** **– Regional administration**

  Pollution abatement within the Lagoon watershed area is the responsibility of the Veneto Region, which has established a framework programme of measures to monitor and reduce pollution in the drainage basin, known as the Master Plan 2000. Pollution abatement and prevention measures programmed by the Veneto Region for the drainage basin to reduce the loads arriving in the Lagoon are now closely co-ordinated with Lagoon water quality control measures (the remit of MAV/CVN).

  The Regione is also responsible for drawing up the territorial plan for the conservation and development of the Venice environmental and settlement system (PALAV). It covers 16 municipalities from three provinces (Padua, Treviso and Venice). Requested under the 1973 Special Law, it took over a decade to formulate, underwent several iterations and was finally approved in 1995.

- ***Provincia di Venezia*** **– Provincial administration**

  The Provincial Administration does not participate in the Comitatone, except on a consultative basis, although it oversees certain key elements of Venice's natural resources, along with about 40 other municipalities within its domain. It has some land use management and environmental protection responsibilities, notably regulating fishing activities in the Lagoon as well as hunting licences, and it runs the environmental police department. It oversees the protection of flora and fauna, natural parks, organises waste disposal at the provincial level and controls effluents and emissions and noise pollution.

  It is responsible for certain restructurings and restorations financed by the Special Law (notably schools and the island of San Servolo); territorial planning including landscape protection and environmental resources; and planning and environmental

education for pollution prevention and control. A small area of the Venice Lagoon falls within the domain of the Province of Padua.

- ***Comune di Venezia* – Venice Municipality**

  The Venice Municipality governs the main urban areas of the Lagoon – the historic centre of Venice, Lido, the islands of Murano, Burano, Mazzorbo and Torcello, and the coastal strip of Pellestrina and San Pietro in Volta in the southern Lagoon, as well as Mestre and Marghera. (About nine other municipalities have territories within the Lagoon and are duly subjected to the special legislation for Venice.)

  In the context of the Special Law, the Comune must look after Venice's historical, cultural, architectural and environmental heritage, while also addressing the socio-economic factors that determine the city's identity and well-being – from stimulating productive activities and controlling tourism to assisting young couples with obtaining affordable housing and providing crèches for infants. Specifically, Special Law funds are used by the Town Council for:

  – acquisition, restoration and refurbishment of buildings for residential, social and cultural, commercial and artisan uses – considered essential to maintaining the socio-economic identity of Lagoon settlements;

  – basic infrastructure (street lights, utilities, etc.) as well as bridges, embankments and canals within the municipal domain, *i.e.* the 45 kilometre inner canal network (whereas the larger canals that are within the MAV remit along with the rest of the Lagoon open waters);

  – subsidies for restoration and maintenance work for private buildings, including for example the installation of lifts in tall palaces (pending approval of the Safeguarding Commission and the local branch of the Cultural Heritage Ministry);

  – acquisition of areas to be converted to productive activities and the associated infrastructural requirements.

  The *Comune* set up Insula SpA for the integrated management of canal dredging, raising street levels, revision of utility pipelines, underground maintenance works, etc. The tide forecasting office is also part of the *Comune*. Executives from the *Comune* regularly set up working groups to review safeguarding policies and interventions in the Lagoon, but their role in real decision making can be weak.

  Source: Adapted and updated from Fletcher, C. and J. Da Mosto (2004), *The Science of Saving Venice*, Umberto Allemandi & C., Turin.

Annex 3.A2

Principal supporting institutions engaged in decision support and research activities for protecting Venice and the Lagoon

- **Agenzia Regionale per la Prevenzione e Protezione Ambientale del Veneto (ARPAV) – Veneto Regional Agency for Prevention and Environmental Protection**

  The Veneto Regional Agency for Environmental Protection (ARPAV) is essentially the technical branch of the regional administration. Its tasks can be summarised as:

  - environmental protection and monitoring;
  - weather forecasting, monitoring and statistical elaborations;
  - organisation and management of the regional information system for environmental monitoring and environment-related epidemiology;
  - environmental education and information services;
  - technical and scientific services for environmental impact assessments and evaluation of environmental damage.

- **ISPRA/*Agenzia per la Protezione dell'Ambiente e per i Servizi Tecnici* (APAT) – National Agency for Environmental Protection and Technical Services**

  The Hydrographic Office has been operating in the Lagoon since 1907 within *Magistrato alle Acque* but was recently brought under the jurisdiction of the central government. It manages a network of 52 tide gauge stations in the Lagoon and upper Adriatic for the systematic measurement of tide level and related parameters, such as wind direction and wind speed, atmospheric pressure, precipitation and wave-height.

- ***Consorzio per la Gestione del Centro di Coordinamento delle Attività di Ricerca Inerenti il Sistema Lagunare di Venezia* (CORILA) – Consortium for Coordination of Research Activities Concerning the Venice Lagoon System**

  CORILA is an association of Ca' Foscari University and the University Institute of Architecture of Venice, the University of Padua and Italy's National Research Council. A non-profit organisation, it is overseen by the Ministry of Education, Universities and Research (MIUR). It was founded in 1999 to co-ordinate and manage research on the Venice Lagoon. The first research programme (2000-2003) cost approximately EUR 10.8 million, of which nearly 60% was funded by the Special Law via the Ministry for Research. Co-financing was provided by other administrations as well as by the research departments and other partners. The second research programme (2004-2007) received just under EUR 6 million from the Special Law, plus co-financing. CORILA no longer has its own research programmes and

now co-ordinates the monitoring of the environmental impacts of MOSE during the construction phase and the development of a Morphological Plan for the Lagoon, under remit by MAV-CVN.

- ***Centro Previsioni e Segnalazioni Maree*** **– Tidal Forecasting and Early Warning Centre**

  Founded in 1980, this agency within the Venice Municipality is responsible for the study and forecasting of storm surge events and for alerting the city in case of significant flooding. Observation of sea level and meteorological parameters is carried out through a monitoring network (11 stations), which gives a real-time view of marine and weather conditions in the Venice Lagoon and along the Adriatic coast. All stations measure sea level, and some also collect meteorological parameters: air pressure, humidity, wind velocity and direction, waves and air temperature.

- ***Consiglio Nazionale delle Ricerche*** **(CNR) – National Research Council**

  The Italian National Research Council for scientific and technological research was founded in 1923. It is composed of dozens of separate institutes, each with a particular specialisation, which have been merged and consolidated lately as part of a cost-cutting, rationalisation strategy. In response to the increasing worldwide concern for the survival of Venice, CNR established the Institute for the Study of the Dynamics of Large Masses in 1969, now incorporated within the Marine Sciences Institute (ISMAR). First created as a laboratory, it has spread from basic research in oceanography and geology to applied research. The other Venice-based branch of CNR-ISMAR is the Institute for Marine Biology, established in 1946 as the National Centre of Thalassographic Studies, which focuses on pure and applied biological oceanography, marine and lagoon biology.

- ***Consorzio per la Ricerca e la Formazione*** **(COSES) – Consortium for Research and Training**

  COSES was established in 1967 by the municipal and provincial administrations to carry out analyses, studies and projects to support public sector activities – essentially via market research, data collection and statistical analyses concerning the urban and regional economy, building sector and housing, commercial distribution, tourism, culture, teaching and education, immigration, demographics, transport (especially water) and urban planning.

- **INSULA SpA**

  Founded in 1997 by Venice's Town Council together with Vesta (waste management), Enel.Hydro (electricity), Italgas (gas) and Telecom Italia (telephones), Insula is now wholly owned by the municipality and is responsible for urban maintenance and, more precisely, measures such as dredging canals, restoration of canal walls, foundations and façades of buildings lining canals, restoring bridges, rationalisation of underground utility lines (and sewer system), maintenance and renovation of paving, raising of footpaths to reduce the frequency of flooding.

- ***Istituto Veneto di Scienze, Lettere ed Arti***

  The Istituto Veneto di Scienze, Lettere ed Arti was founded by Napoleon Bonaparte "to collect discoveries, and to perfect the arts and sciences". Its current mission is to

increase, promulgate and safeguard the sciences, literature and arts, bringing together outstanding figures from the world of scholarship. The Institute also supports special research projects that concern Venice and the Veneto, and which are addressed to the international community. Together with various universities and the National Research Council, it has also set up specialised centres for research into environmental questions, into philological and literary aspects of the language of the Veneto, and into hydrology, meteorology and climatology. It runs a programme to integrate and share environmental data among all the major institutions and research bodies.

- ***Università Ca' Foscari di Venezia***

  The University dates back to the late nineteenth century, and its students account for a significant proportion of the local population of Venice's historical centre. With four faculties and 19 departments, many key disciplines are offered and Venice often hosts important research and modelling activities. The Università Ca' Foscari di Venezia had a total of 17 639 enrolled students, 553 faculty, 503 permanent technical-administrative staff, and 238 contract technical-administrative staff (Ministero dell'Istruzione, dell'Università e della Ricerca, 2007).

- ***Università IUAV di Venezia***

  Founded in 1926, the University IUAV is an international reference point for architecture, history, design and restoration, as well as for town and land use planning. Venice's IUAV University is the only Italian university entirely dedicated to teaching design in any field that concerns space and the built environment through its architecture, urban planning, and design programmes. It also has laboratories for construction science and the analysis of ancient materials. The Università IUAV di Venezia had a total of 5 864 enrolled students, 198 faculty, 255 permanent technical-administrative staff, and 19 contract technical-administrative staff (Ministero dell'Istruzione, dell'Università e della Ricerca, 2007).

- ***Università degli Studi di Padova*** **– Padua University**

  Founded in 1222, Padua University was the first in the world to award a degree to a woman, Elena Lucrezia Cornaro Piscopia, in 1678 (in philosophy). It has 13 faculties and 62 departments and is a world leader in hydraulic engineering, biology, agricultural sciences, chemistry, mathematics and many other branches of science – not to mention centuries of tradition in law and medicine. Padua University had a total of 63 409 enrolled students, 2 379 facutly, 1 945 permanent technical-administrative staff, and 528 contract technical-administrative staff (Ministero dell'Istruzione, dell'Università e della Ricerca, 2007).

- **UNESCO Office Venice**

  Following the disastrous floods of 1966 in Venice and Florence, and the Italian government's invitation for UNESCO to contribute, the Liaison Office for the Safeguarding of Venice was established in 1973 on the occasion of the UNESCO International Campaign for the Safeguarding of Venice. In 1988, the UNESCO Scientific Co-operation Bureau for Europe was relocated from Paris to Venice, and in 2002, UNESCO established a single office in Venice with the mandate to achieve the goals of UNESCO and member states in the fields of science and culture. The

UNESCO Office Venice actively promotes, sponsors and convenes international scientific and cultural events in Europe and in the Mediterranean region. A unifying theme for UNESCO is contributing to peace and human development in an era of globalisation, through education, the sciences, culture and communication.

- **International Private Committees for the Safeguarding of Venice**

After an appeal launched by the Director-General of UNESCO in 1966, over 50 private organisations were established in a number of countries to collect and channel contributions to restore and preserve Venice. Over the years, the International Private Committees have worked closely with the Superintendencies of Monuments and Galleries of Venice, through UNESCO, to identify and address priority needs. Since 1969, they have funded the restoration of more than 100 monuments and 1 000 works of art, provided laboratory equipment and scientific expertise, sponsored research and publications and awarded innumerable grants for craftsmen, restorers and conservators to attend specialist courses in Venice. Annual expenditure by the private committees is well in excess of EUR 1 million.

Source: Adapted and updated from Fletcher, C. and J. Da Mosto (2004), *The Science of Saving Venice*, Umberto Allemandi & C., Turin.

Chapter 4

Metropolitan governance: a goal in search of a model

To effectively address the Venice city-region's economic and environmental challenges would require changes to current governance practices and frameworks. Co-ordination, both within a single level of government and vertically between levels of government, is necessary to articulate a series of commonly defined policy objectives. Chapter 4 identifies and analyses the factors involved in the most appropriate and effective multi-level governance structure for the Venice city-region. A series of recommendations are proposed to strengthen the Venice city-region's competitiveness, including tools and instruments for compact land use planning, strengthening planning for a polycentric metropolitan region (especially in such areas as transit, tourism management, and climate change action planning), and the adoption of a metropolitan spatial vision into the public policy process. Given the Venice city-region's highly polycentric structure, "soft instruments", i.e. *voluntary partnerships and the creation of a metropolitan spatial vision, have immediate potential. The chapter proposes new governance arrangements to increase inter-sectoral co-ordination through performance standards and the facilitation of experimentation and pilot projects with area-wide policy co-ordination and service provision.*

To effectively address the Venice city-region's economic and environmental challenges would require changes to current governance practices and frameworks. Co-ordination, both within a single level of government and vertically between levels of government, is necessary to articulate a series of commonly defined policy objectives. The following chapter will identify and analyse the facilitating and constraining factors involved in the most appropriate and effective multi-level governance structure for the Venice city-region. This exercise will help to specify the shape it might take in terms of its strategic position within existing governance and economic networks.[1]

Metropolitanism can be considered an unfinished project: the Venice city-region still remains emergent or a "goal in search of a model".[2] The Venice city-region is developing into a functional metropolitan area, based on increased commuting flows and economic links between the different cores of the area, and policy formulation and service provision on the metropolitan scale has increased in response to this, but several gaps remain. In many ways, the city-region faces a challenge, not uncommon in OECD metropolitan regions, in that it consists not of one dominant city, but three cities with strong traditional and distinctive identities. Today, metropolitan co-ordination is therefore the challenge of "organising connectivity" (Salet *et al*., 2003) and to connect the power interspersed across the multiplicity of territorial sites that constitute "nodes" represented by different actors. Key regional issues transcending the administrative boundaries in the Venice city-region include metropolitan transportation, tourism and land use, all of which lack either institutions or robust co-operative agreements at the metropolitan scale.

Despite improvements in the governance framework, several issues remain as priorities: innovative capacity, skills adapted to future labour market needs and integration of the immigrant population. Such policy challenges are all the more urgent considering global competition and the economic downturn, which has markedly affected SMEs heavily integrated into global markets, particularly in the design and textiles industries. Building on decentralisation and attempts at co-operative governance relations in recent years, several governance challenges have yet to be tackled to strengthen the Venice city-region's competitiveness:

- **Tools and instruments for compact land use planning merit further development.** Suburban sprawl has increased, which limits the city-region's productivity, because it limits the benefits of agglomeration and increases its costs (such congestion and the provision of public services provision). Despite policies aimed at controlling land use, developments on new land have continued, and few instruments and policies have been put in place to achieve land use goals.
- **Limited involvement of higher-level government.** Regional and state government have shown only limited interest in the project of metropolitan Venice. Although several polycentric regions have managed to co-ordinate their constituent parts, the involvement of higher-level governments is important in designing synergies and overcoming localism.
- **Nascent strategic planning for a polycentric metropolitan region.** Although metropolitan co-ordination within the city-region has increased, this has related more to the provision of basic local services than strategic policy development. Although existing mechanisms, such as inter-municipal co-operation, could be further developed to achieve policy goals at the metropolitan level, this model also has its limits. Serious reflection is needed on the models that are required for the future, based on estimations of the potential costs and benefits. The establishment of metropolitan functional organisations in such areas as transit

needs to be considered in this analysis. Synergies from polycentricity could be gained if strategic planning for the metropolitan region extended further to the area of economic development.

- **An incomplete integration of a metropolitan spatial vision into the public policy process.** The vision of a metropolitan area has by and large not filtered into policy formulation, implementation or evaluation and into the mainstream public policy-making process yet.

This chapter will argue for the adoption of various changes to the governance arrangements in the Venice city-region. In order to limit suburban sprawl, a larger set of policy tools and instruments would be needed to control land use developments. Reflection on future governance models for the metropolitan region is called for, as the limits of current co-operative approaches are becoming clear. While this could take the form of metropolitan functional bodies, for example in the case of transit, new governance arrangements could be shaped to increase inter-sectoral co-ordination.

4.1. The Venice city-region in the Italian governance framework

The Venice city-region does not have one single unified metropolitan government. It covers three provinces and 243 municipalities; and it forms part, together with four other provinces, of the Veneto Region. As such, not one but several actors are responsible for the competitiveness of the area. This multi-level government framework is subject to different political majorities in the different sub-national government bodies. In addition, other public stakeholders, such as the Venice Port authority, influence metropolitan competitiveness, adding to the institutional complexity.

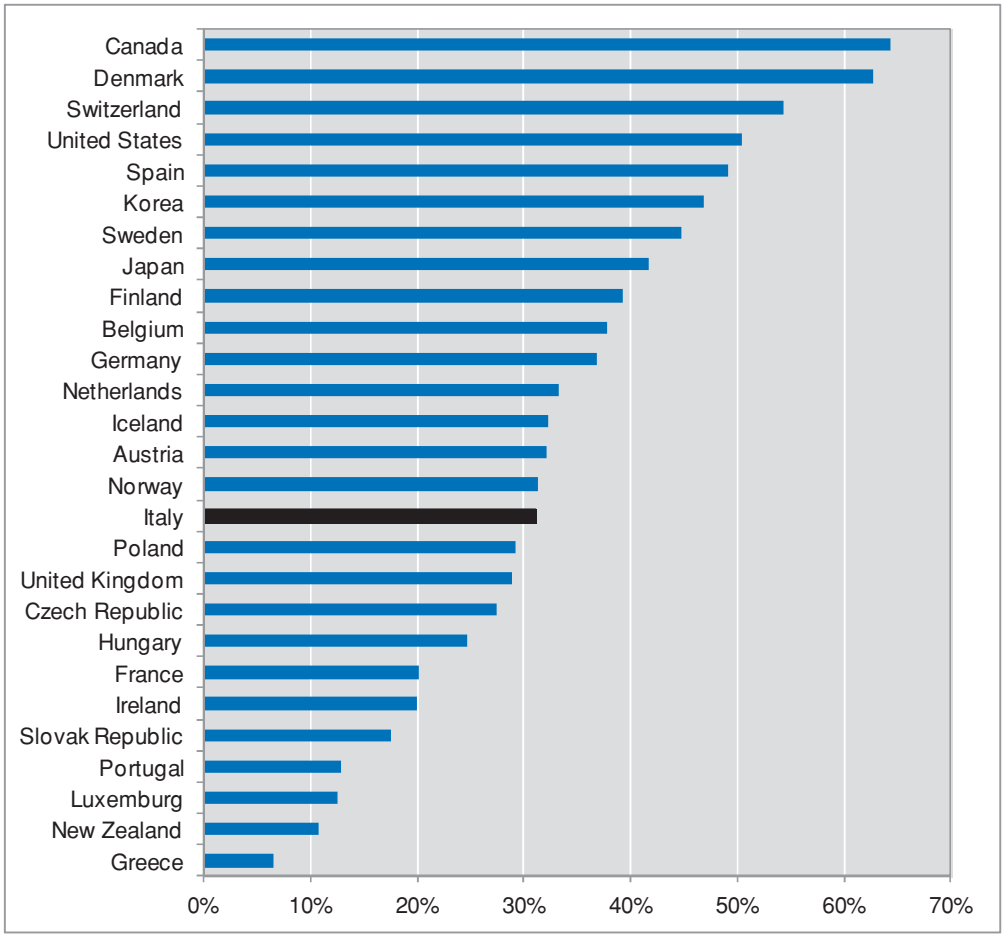
This structure has materialised after a series of decentralisation reforms in Italy beginning in the 1970s. A first wave of institutional decentralisation began in 1970 with the creation of 15 "ordinary regions" (including the Veneto), which formally completed the profile of the country's constitutional design of 1947, that of a unitary state with a decentralised institutional and decision-making structure, unfolding over the national, the regional and two local (provincial and municipal) jurisdictional levels. These reforms were put into effect in 1977, when implementation decrees transferred many "primary" legislative functions from the state to the regions, making them co-decision makers with the state and consolidating their role. This created a three-corner game (state, region and local levels, including the provinces and municipalities that have "delegated" powers from the state and regions) where two levels (state and local) had previously existed. In the 1990s, the structure of territorial governance in Italy was reshaped by a second wave of decentralisation. More of the powers and functions of the central government were conferred on regional and local authorities, a process that has been coupled with a radical change in the electoral system and sizeable reforms in public administration. While the new allocation of functions has entailed a redistribution of resources, it has only marginally strengthened the revenue-raising capacity of regional and local governments. These constitutional reforms came into effect in 2001.

The result of these reforms is a sub-national government framework in which regions are the dominant powers, despite relatively limited autonomous revenue-raising authority. Successive waves of decentralisation have brought the size of sub-national expenditures in Italy in line with the OECD average: in 2005, the share of sub-national expenditure in Italy amounted to 31%, which placed it slightly below the OECD average of 33% (Figure 4.1). Of all sub-national government tiers in Italy, the regions have the largest budgets and responsibilities: they represent approximately 60% of the total sub-national

expenditures in Italy, with provinces and municipalities accounting for the other 40%. The regions' primary responsibilities are health and social services, urban planning, vocational training, culture and tourism, regional public transportation, environment and housing. These are translated into main expenditure items in the budget: the Veneto Region spent more than 55% of its budget in 2005 on health and social services, 8% on education and 4% on roads and transport (Figure 4.2). Regions can potentially legislate on all matters that do not fall within the sphere of responsibility of central government. By comparison with the regions' responsibilities and authority, the role of municipalities and especially the provinces is much weaker. Provinces have jurisdiction over environment, territory and road infrastructure matters; and over services for residents and the community, such as environmental protection, professional training and cultural heritage. Municipalities mostly provide local public services, such as social housing, local public transportation, municipal roads, local police, and the building and maintenance of primary and pre-elementary schools. Municipal authorities in the Veneto have also demonstrated a competence at important economic development tasks (Solari, 2004). General administration, however, was the main item of expenditure for municipalities in the Veneto region (Figure 4.3).

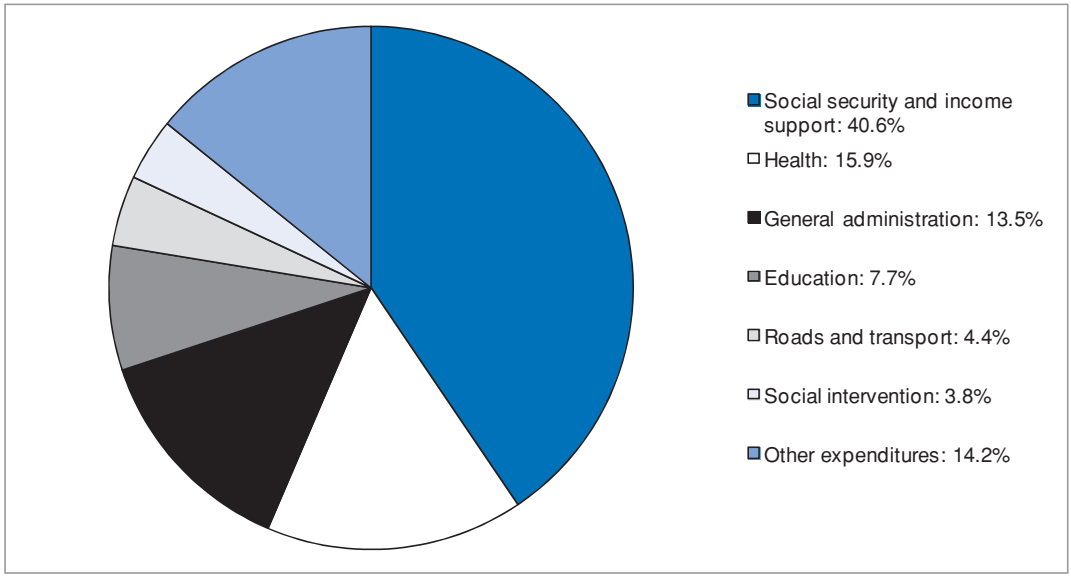
Figure 4.1. **Sub-national expenditure of OECD countries and Italy**

As share of total government expenditures in 2005



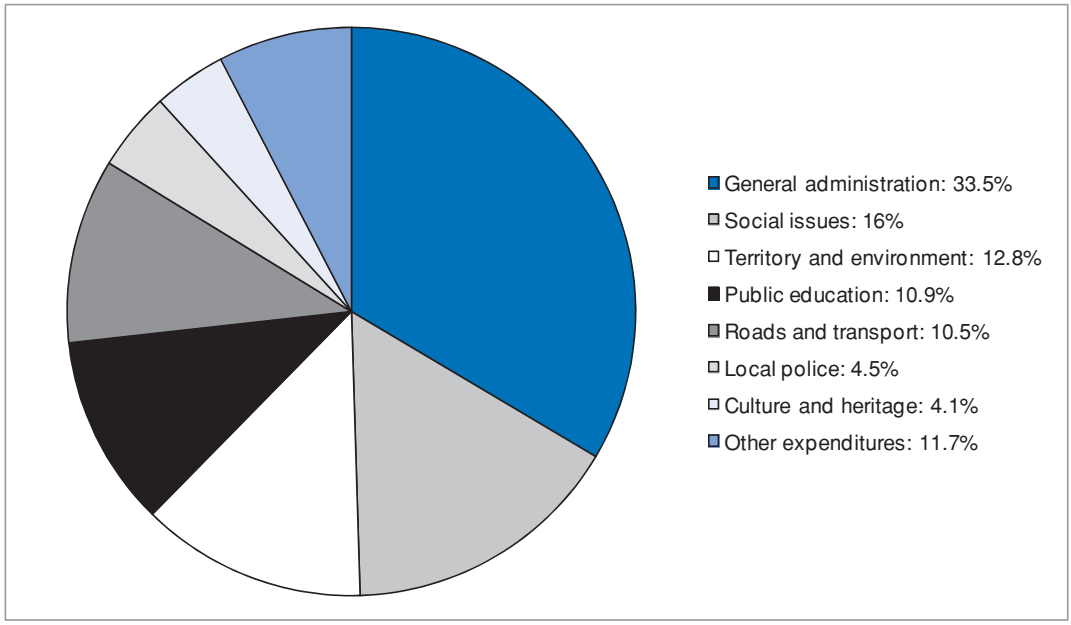
Source: OECD National Accounts Database.

Figure 4.2. **Main expenditure items as a percentage of the total budget in the Veneto Region, 2005**



Source: Regione del Veneto (2008), *Rapporto Statistico 2008: il Veneto si racconta il Veneto si confronta*, Regione del Veneto, Venice.

Figure 4.3. **Main expenditure items as a percentage of the total current budget municipalities in the Veneto Region, 2005**



Source: Regione del Veneto (2008), *Rapporto Statistico 2008: il Veneto si racconta il Veneto si confronta*, Regione del Veneto, Venice.

Some responsibilities are shared among different government tiers, a situation that complicates effective public service delivery. Health, for example, is a major responsibility of the regions but is largely controlled centrally (*e.g.* wages of the health sector workers, rules for recruitment and lay-offs). In the education sector, the central government still finances teachers' wages and equipment, while the financing of non-teaching staff is divided between municipalities (kindergartens and scientific high schools), provinces (technical high schools) and the central government (classical and professional high schools). Such overlaps create many grey areas, where several levels of governments can be considered responsible. This can create gaps in service delivery, especially when agencies are designated to allocate funding, but do not see much of the benefits or have much control over aspects of the services. These overlaps have led to court cases and have frequently ended in lawsuits in the Constitutional Court.

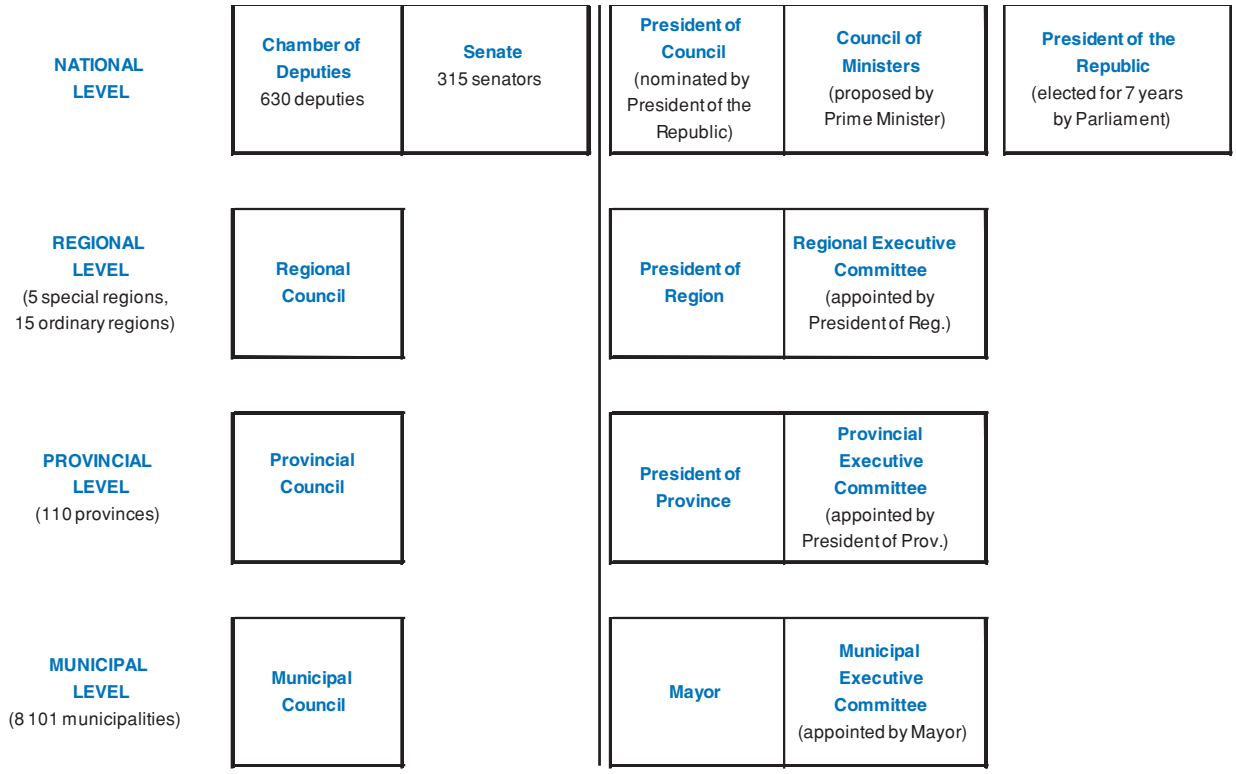
A special status for metropolitan areas such as Venice is foreseen in the Italian constitution, but has so far not been implemented. In 1990, the Law No. 142 on Local Self-Governing Entities introduced the possibility of setting up metropolitan structures. According to this law, some of Italy's largest municipalities (Rome, Milan, Naples, Turin, Florence, Venice, Bologna, Genoa and Bari) and the municipalities closely linked to them could be considered metropolitan areas (*area metropolitana*). The newly created metropolitan areas were to have a two-tier administrative structure: one metropolitan city (*città metropolitana*) at the higher tier, and regular municipalities at the lower tier. The possibility of creating metropolitan cities was also introduced in the 2001 constitutional reform, but has not yet been translated in concrete legislation, and no metropolitan city has been created thus far. The metropolitan city of Venice is in this constitutional context defined more narrowly than the definition used in this Review.

The executive power of sub-national governments in Italy has been strengthened during the last two decades with the introduction of direct elections for the heads of the executive branches: mayors and provincial presidents (since 1993), and regional presidents (since 2000). All sub-national legislative bodies are directly elected by the population.

4.2. Strategic planning for a polycentric metropolitan region

Increasing spillovers within the Venice city-region have consequences for governance. As in many OECD metro-regions, larger commuting flows, economic relations and other functional linkages indicate that the metropolitan region of Venice is increasingly becoming the daily urban system in the lives of residents, supplanting the individual cities or provinces. This means that local actions will have regional spillovers: firms will attract labour across local boundaries as residents commute; and they may choose to live in a municipality with a good quality of life, but work elsewhere and make use of cultural amenities and public services in another municipality. The different local areas within the Venice city-region are becoming interdependent and will need to co-ordinate their activities in order to take spill-over effects into account: if only local effects are considered, there is a risk of under-investment (when there are positive spillovers) or over-investment (in the case of negative spillovers).

Figure 4.4. **Government levels in Italy**



The growing polycentricity of the Venice city-region presents particular challenges. The competitiveness of polycentric regions is highly dependent on the quality of intra-regional connectivity and the public transport system, but the provision of public transport in such regions is complicated, since the classical radial model typical in monocentric cities cannot be applied. Venice has grown gradually into a polycentric area where the challenge for regional transit is to integrate the transport networks of different urban centres into a coherent whole. The lack of a dominant central city in polycentric regions can also fail to produce the critical mass to develop large-scale infrastructure projects. All these issues are more difficult to tackle for polycentric metropolitan regions characterised by strong institutional fragmentation, represented by a number of local governments, and in some cases, representing different administrative layers without a strong local leadership (OECD, 2006a).

Polycentricity can potentially result in synergies, but this requires strategic planning. Economic activities in different areas of the Venice city-region could complement each other and lead to innovation, in terms of new products, markets or product-market combinations amongst linked but co-operatively competing firms. The specialisations of the main three cities within the Venice city-region leave potential for such synergies. Foreign investment could be attracted to the Venice city-region using a combination of the assets of the different cities: the brand and appeal of the city of Venice, the knowledge cluster in Padua and the industrial capacity of Treviso. Similarly, the tourist appeal of Venice could create wider regional benefits, for example by attracting conference visitors relevant to economic sectors in Padua and Treviso, while investment in accommodation for commuting tourists in the Padua and Treviso areas could relieve the pressure on

housing costs in Venice. The attraction of public investment could be directed at areas where synergies could be anticipated; duplication of activities should be avoided.

The Veneto Region has developed a strategy for issues affecting the three provinces of the metro-region through its regional territorial co-ordination plan (*Piano Territoriale Regionale di Co-ordinamento*, PTRC). The PTRC is important in recognising: *i*) the international role of the Venice city-region as spanning two Euro-regions (the Adriatic and north-east Euro-region); *ii*) the polycentric nature of the Venice city-region, as previous regional territorial plans have done; and *iii*) a number of issues that require strategies at the metro-regional level, including land policies designed to combat urban sprawl (Box 4.1). Within the PTRC, the Region addresses the importance of a metropolitan approach; it argues that "[t]he informal way that housing, manufacturing and services have expanded in the central area has constituted a process entailing extensive utilisation of space, a growing strain on territory as a resource, the deterioration of the outlying districts and congested mobility" (Regione del Veneto, 2009e). It largely calls for the co-ordination of municipal Urban Mobility Plans (*Piano Urbano di Mobilità*, PUM) to integrate infrastructural and urban planning, with a view to densification of the central metropolitan area. However, its goals have not been supported by policy tools that could allow a reconsideration of the huge increase in land consumption provided for in plans that have been approved but not yet implemented. The PTRC also espouses a vision of a borderless region – the open acknowledgement of Veneto being part of a vast system (the Po Valley) and its connections to Trans-European Corridor 5 (Lyon-Kiev)[3] – and a territorial system, which has not been organised explicitly. With the PTRC and the linked urban plan that is currently under development, the regional administration is seeking to develop a *capitale plurale del Veneto*, which roughly translates to a polycentric Veneto.

Box 4.1. **The goals of Veneto's Regional Territorial Co-ordination Plan, 2007**

1. Reformulation of the regional development policies according to a vision of European space, whereby their reference incrementally becomes the wider geographical context rather than traditional regional boundaries.

2. Total commitment to the preservation of precious and irreproducible territorial assets, rather than rapidly consuming or depleting them.

3. Recognition of urban polycentrism as the distinctive and basic characteristic of the "Veneto model", according to a network logic, in order to create critical mass to remain nationally and globally competitive.

4. Re-organisation of the transport system for greater sustainability, restricting the dispersion of land uses and the multiplication of trips and re-enforcing the identity of cities and towns.

Strategic planning for the metropolitan region has been mostly related to spatial planning and infrastructure development. The Veneto Region's Transport Plan (*Piano Regionale dei Trasporti*) stresses the need for inter-regional mobility policies and a re-organisation of the region's road system. This is also echoed by the Territorial

Co-ordination Plan of the Province of Venice, which foresees the area between Venice and Padua as the "complementary centres of a multi-centre framework". An important attempt at a broader regional strategy is the Regional Development Plan (*Piano Regionale di Sviluppo*, PRS) approved by the executive board at the end of 2004 and by the Regional Council in March 2007. There is no doubt that the PRS has given new impetus to all regional sectoral policies since 2003 and their planning formulation at the regional and lower institutional levels: provincial and municipal. This however, does not mean that regional plans have been completely translated into local plans. The zoning and land use provisions designed at a municipal level often lack norms to promote mobility within the city-region and co-ordination on land use. In addition, there are questions concerning the lack of enforcement of existing codes and norms. There are three possibilities for strengthening the implementation of such a metropolitan vision and internalising spill-overs: *i*) increasing the alignment of lower orders of government to the regional vision; *ii*) co-ordination among municipalities or provinces; or *iii*) the creation of a metropolitan government level.

4.3. Vertical co-ordination

Over the last decade, mechanisms have been approved to increase policy co-ordination between central and regional governments in Italy. The traditional centralised planning procedures for public investment were replaced by a new system under which regions and the central government co-plan and co-finance infrastructures and public investments. An attempt to bring together these different strands into a comprehensive regional policy, the so-called Territorial Competitiveness Policy, began in 1998, establishing guidelines and rules for the use of European funds and national co-financing for capital spending in Italian regions. This included the introduction of strong performance incentives, *e.g.* the implementation of a 10% performance reserve for regions and central administrations, to encourage the implementation of administrative reforms deemed necessary to put the plan into practice (OECD, 2001).

The Italian national government is involved in a number of issues directly affecting the Venice city-region. One involves Port Marghera, a major European centre of the chemical industry, which has for years been involved in major renewal efforts that have required central government support. The central government has also been involved in decisions regarding the Mestre Bypass and the MOSE project. Similarly, the Magistrato alle Acque has for many years been a specialised office of the national Ministry of Public Works. Today it is responsible for the management, protection and safety of the waters in the three regions of north-eastern Italy and the metro-region in particular. The Special Law for Venice, used for various purposes in the strategy for protecting the city from the sea, comes under the responsibility of the Magistrato. Finally, a national investment and business development agency (Agenzia Nazionale per l'attrazione degli investimenti e lo sviluppo dell'impresa S.p.A.) is responsible for making the area attractive to possible foreign investors and to promote innovation, business skills and competitiveness in the industrial system. The national Ministry for Infrastructure and Transport's Programme of Urban Renewal and Sustainable Territorial Development (Programmi di Riqualificazione Urbana e di Sviluppo Sostenibile, PRUSST) has also tried to support inter-municipal co-operation on territorial projects.

Vertical co-ordination mechanisms between the Veneto Region and the local governments in its territory can still be improved. Some co-ordination mechanisms are in place, for example with regards to immigrant integration. A regional consultative body

(*Consulta dell'immigrazione*) has been permanently established to act as a sounding board on new policy initiatives, bringing together representatives of the 183 associations of immigrants registered in the region. Another more operational consultative instrument of participation is the *Tavolo unico dell'immigrazione,* where municipalities and provinces meet with interest associations and representatives of associations from the *Consulta*, to build consensus on issues. In land use planning, the Region supports a roundtable for vertical policy co-ordination.[4] Despite such promising initiatives, these programmes have not exhibited clear outcomes to date.

Internal contradictions and frequent exceptions (*deroghe* and *varianti parziali*) weaken many of the plans approved in the Venice city-region. Though governments throughout the OECD accept variances to official plans in exceptional circumstances, these have been permitted excessively in the Venice city-region. Development outcomes, consequently, frequently deviate from standards mandated by a plethora of laws and bylaws in the Venice city-region. For example, though the 1985 regional plan contained provisions to protect the traditional rural landscape, its power was undercut by Law 24/1984, which facilitated new sprawling rural developments. Likewise, despite the good intentions of the Veneto Region Law (11/2004), which established rules for land governance to promote development consistent with environmental sustainability and densification, large developments can be accommodated due to the many amendments that have been made to existing municipal plans (*Piani Regolatori Generali*, or PRG). Though one of the most important elements in Regional Law 11/2004 consisted of the introduction of the Strategic Environment Assessment (VAS) to guide urban land conversion towards more environmentally sensitive models, there are concerns about the quality and regional co-ordination of these assessments. Regional Law 11/2004 also created a new municipal development instrument, the Structure Plan (*Piano di Assetto del Territorio*, PAT), which outlines the strategic policies for the layout and development of the municipal area.[5] Nonetheless, to date, the PAT process is largely disengaged from the urban development policies, which are established at the provincial level through each province's territorial co-ordination plan (*Piano Territoriale di Coordinamento Provinciale*, PTCP) (Marson, 2009).

Throughout the Venice city-region, urban plans are regulatory and there are several cases where they have been ineffective. Illegal building has sometimes been tolerated, and industrial sprawl has occurred despite the existence of laws that promote denser urban form. There are questions concerning the lack of enforcement of existing codes and norms. Equally important, despite the policy shift away from the "urbanised countryside model" and its extensive land consumption[6], more progressive planning policies have not always been embraced. For example, the Venice Province's Territorial Plan (*Piano Territoriale Provinciale*, PTP) of 1999 was never adopted by the regional government even though it favoured a more rationale allocation of land. This PTP promoted many policies to restrict urban sprawl, including a requirement that industrial development proposals over five hectares in size would need to go through a rigorous environmental evaluation and local stakeholder consultation process. In Article 43, it also placed limits on land development for parities who had not completed the infrastructure required by previous developments or who had left developments incomplete (Provincia di Venezia, 1999).

Governance of the Venice city-region is complicated by its polycentric nature and the concurrent mandates of regions and local governments. The Veneto Region is responsible for co-ordinating with the three provinces, each dominated by powerful cities, and for mediating conflicts over concurrent mandates in such fields as economic development

and environmental policies. A strong regional role might bring together the different actors to decide on a common strategic vision, including programmes to implement this vision. The Veneto Region could in this respect be compared with the Netherlands, which also has a dominant metropolitan region (Randstad), without a single unified metropolitan government, but covers several relatively weak provinces dominated by powerful cities, Amsterdam, Rotterdam and The Hague.[7] To overcome institutional deadlock, which had resulted in declining competitiveness, increased traffic congestion and lacklustre performance in innovation, the Dutch government formulated a strategic Randstad agenda, engaging every level of government (Box 4.2).

Box 4.2. **Vertical co-ordination in polycentric metropolitan regions: the case of the Randstad**

The Randstad is the urbanised western part of the Netherlands, consisting of the four largest cities in the Netherlands (Amsterdam, Rotterdam, the Hague and Utrecht) and several other smaller cities. This polycentricity requires co-ordination, especially since the proximity of the different urban poles leads to many spill over-effects. Co-ordination of transport and economic development, as well as cluster development, higher education, housing and office space, involves numerous government actors. The Randstad lies within four provinces, and includes 147 municipalities within its unofficial boundaries. The multiplicity of platforms for of horizontal intergovernmental co-ordination was compounded further by relations with the central government. In response to the perceived lack of co-ordination, the mayors of the four largest cities proposed in 2006 to create a single province for the Randstad. This provoked a lively debate, emphasising both the need for better co-ordination and the difficulty of arriving at politically acceptable reforms.

After the *OECD Metropolitan Review of the Randstad*, which was published in 2007, the Dutch government decided to draw up a Randstad urgency programme, specifying actions to be taken in the short and long term. Key themes were accessibility, economic dynamism, quality of life and sustainability. Joint responsibility for implementation is its guiding principle, rather than changing government structures. For example, by creating a Randstad province, it aims to find governance partnerships that can achieve results. It introduces a novel way of creating political commitment through proposing pairs of officials responsible for progress on particular projects, composed of a central government minister or state secretary on the one hand and a regional or local politician on the other. Funds were made available for 33 projects, and a minister for the Randstad has been appointed to hold the duos accountable for their progress.

4.4. Horizontal co-operation

Metropolitan co-ordination is essential in the Venice city-region, given that the functional metropolitan area spans more than 200 municipalities. Dealing with inter-jurisdictional spill-overs is essential to ensure that sectoral policies are coherent, or at least not contradictory. Institutional fragmentation in the Venice city-region has made it difficult to reach area-wide consensus on medium- and long-term goals in environmental quality, economic development, public finance and the quality of public services across the urban region. Lack of co-operation has in some cases led to a mismatch between decision makers, taxpayers, and beneficiaries of public services. Caution is warranted, however, as policy makers consider their options. Hawkins and Ihrke (1999) analysed 30 empirical studies and concluded that 21 supported the hypothesis that inter-municipal

competition lowers the cost of public services or does not increase expenditures. Nine studies, however, concluded that inter-municipal competition increases costs or has other damaging effects.

Policy makers in the Venice city-region could pursue a wider range of instruments for metropolitan co-ordination. Areas such as transportation involve extensive externalities, and regional co-ordination is important. For housing policy, a mixed system might be useful. Localities would maintain control over land use decisions, but regions or territories (*i.e.* provincial governments) would provide incentives to encourage localities to make the right choices (Glaeser, 2007). Depending on the policy objectives, several models have been applied in OECD metropolitan areas to achieve policy alignment, ranging from inter-municipal co-ordination mechanisms to single-purpose bodies, multi-purpose bodies and metropolitan government (Box 4.3). Each model requires a different degree of institutional complexity and brings with it a different set of advantages and disadvantages. Indeed, while co-operative organising around symbolic projects provides an *ad hoc* solution that does not modify the existing structure of government, amalgamating municipalities into a larger city requires more serious structural changes.

Box 4.3. **Types of metropolitan governance**

Relatively easy

1. Informal co-operation around symbolic projects
2. Inter-local service agreements
3. Joint powers agreements
4. Extraterritorial powers
5. Regional councils of government (COGs)
6. Federally encouraged single-purpose districts
7. State planning and development districts (SPDDs)
8. Contracting from private vendors

Moderately difficult

9. Local special districts
10. Transfer of functions
11. Annexation
12. Metropolitan special districts and single-purpose agencies
13. Metropolitan multi-purpose districts
14. Tax-base sharing and redistributive grants

Very difficult

15. One-tier consolidation: city-county and area-wide consolidation
16. Two-tier restructuring: federal structures
17. Three-tier reform: metropolitan-wide structures

Source: Adapted from Walker, D.B. (1987), "Snow White and the 17 Dwarfs: From Metro Co-operation to Governance", *National Civic Review*, No. 76, pp. 14–28; Salet, W., A. Thornley and A. Kreukels (eds.) (2003), *Metropolitan Governance and Spatial Planning: Comparative Case Studies of European City Regions*, Spon Press, London and OECD (2006), *OECD Territorial Reviews: Competitive Cities in the Global Economy*, OECD Publishing, Paris.

Given the additional complexity of a highly polycentric structure, "soft instruments", *i.e.* voluntary partnerships and the creation of a metropolitan spatial vision, have immediate potential for the Venice city-region. These bottom-up projects tend to emerge from municipalities themselves and feature partnerships between the public sector, private agencies and civil society. By and large, a spatial conceptualisation of the Venice city-region has not informed many maps or strategic policy documents. A non-binding spatial vision of the area has the potential to change and generate policy formulation by a wide variety of actors. That is, a metropolitan spatial vision could affect the policy process – agenda setting, policy formulation and approval, implementation, feedback evaluation, and dissemination of ideas and replication elsewhere – not just the policy outcomes that could emerge from metropolitan governance.[8]

Today, the metropolitan area has a complex political geography. Until 1992, the region had been dominated by the Christian Democratic Party (*Democrazia Cristiana*, DC), which also provided the main party in all post-war Italian national governments until then. Two forces emerged in the Veneto in the early 1990s: *Forza Italia*, a party created in 1994, and the Northern League (*La Lega Nord*), a federation of regional parties of Northern Italy established in 1991. The impact on the Veneto and on the Venice city-region was to strengthen the existing presence of the *Liga Veneta*, the first regionalist party to be created in 1980 in an "ordinary" region.[9] Between 1995 and 2009, a coalition led by *Forza Italia* held the presidency of the Veneto Region, which was won by a coalition led by the Northern League in the 2010 regional elections.[10] In 1994, the Northern League won the mayorship of Treviso and gained control of the province of Padua (which it lost to parties of the centre-left in 1999 but regained in 2009). However, the centre-left has held the mayoralty of Venice (since 1993), of Padua (2004-current), and the province of Venice (1990-2009). The result is that, more than in other parts of Veneto, the Venice city-region has exhibited a split of majority coalitions between different political directions (Table 4.1).

Over the last decade, there has been a tendency in the Venice city-region to create metropolitan policy co-ordination through inter-municipal co-operation, at times involving municipalities governed by different political coalitions. In the area of economic co-operation, there are protocols of understanding, for example between Venice and Padua (2007), to advance policies for the metropolitan scale in order to strengthen competitiveness. The two cities have created an axis of closer collaboration, building on the logic of their economic complementarities and expanding functional connections. An important experiment of territorial partnership is the ongoing *Intesa Programmatica d'Area* (IPA) process, an area-wide programmatic accord and permanent political forum (*tavolo*) of municipalities which assesses and contributes inputs to regional policies. Another example of innovation is the numerous inter-communal plans among rural municipalities, which did not exist a decade ago.

Table 4.1. **Regional elections in Veneto, 2010**

Percentage of the vote by province and region

Political Party	Treviso Province	Venice Province	Padua Province	Veneto Region
Lega Nord	48.6	26.1	31.4	35.2
Il Popolo della Libertá	15.6	26.3	25.7	24.7
Alleanza di Centro Democrazia Cristiana	1.0		1.5	0.8
Coalition total	65.1	52.4	58.6	60.7
Partido Democratico	18.2	26.7	20.4	20.3
Di Pietro Italia dei Valori	5.5	6.3	5.8	5.3
Sinistra Ecologia Libertà	0.6	1.6	1.8	1.2
Rifondazione Comunista, Sinistra Europea, Comunisti Italiani	1.2	2.8	1.3	1.6
Idea-Nucleare No Grazie	0.4	1.3	0.9	0.7
Liga Veneto Autonomo				0.2
Coalition total	25.8	38.7	30.2	29.3
Unione di Centro	3.9	3.7	6.1	4.9
Unione Nord Est	1.9	1.3	1.5	1.5
Coalition total	5.8	5.0	7.6	6.5
Movimento 5 Stelle www.beppegrillo.it	2.2	3.1	2.6	2.6
Veneti Independensa	0.3	0.3	0.4	0.4
Forza Nuova	0.3	0.2	0.4	0.3
Partito Nasional Veneto	0.5	0.3	0.3	0.3
Coalition total	100.0	100.0	100.0	100.0

Source: *Ministero dell'Interno Dipartimento per gli Affari Interni e Territoriali* (2010), "Elezioni regionali ed amministrative del 28-29 marzo 2010", *http://regionali.interno.it*.

Horizontal co-ordination has in many instances evolved into joint service provision. A successful example in the Venice city-region is the area-wide management of services through inter-municipal collaboration, leading to the creation in 2007 of the first area public multi-service company in the Veneto region, VERITAS (*Veneziana Energia Risorse Idriche Territorio Ambiente Servizi*). Replacing four local companies, it offers integrated water and waste collection and disposal services at the metropolitan scale to 25 municipalities; sells and distributes energy through sister companies: and offers integrated management of urban services and industrial services, including wholesale markets and the environmental clean-up of polluted sites. Furthermore, a protocol of understanding has recently been signed at the higher level of the two provinces of Treviso and Venice (2009) to ensure the enforcement of common management practices in regard to urban policies, transport and waste disposal. These are laudable initiatives, as inter-municipal co-operation is in many instances able to capture economies of scale. Considerable co-ordination costs are sometimes incurred, due to the involvement of many different actors, but some of the transaction costs usually associated with mergers can be avoided. As local utilities have in many OECD countries been de-politicised or privatised, such mergers tend to arouse less political resistance, and reform efforts thus entail fewer transaction costs. Future reform efforts in this area deserve reflection, and further co-operation, including mergers, should be assessed, based on estimations of potential gains in efficiency.

Similar co-operative processes seem to be under way for public transport. Two projects deserve mention: the involvement of the special administrator for Mestre's Beltway and the company for integrated transportation in the Veneto. The special administrator for Mestre's Beltway is the sole representative of all the competent organisations from each area involved in the realisation of the Beltway, which connects Mestre to Venice. This role could be considered an experiment in metropolitan government to test the need for metropolitan management of certain processes. In 2009, the Company for Integrated Transportation in the Veneto (*Società dei Transporti Integrati del Veneto*, STIV) was set up as an independent legal entity aiming at the creation of a public transportation system in the Venice-Padua-Treviso metropolitan area. Based on municipal consensus on the Veneto Integrated Transportation System, which would harmonise fare systems in the different regional transit systems in the Venice city-region, its goal is improved mobility between and within each province.

Since the Venice city-region has no integrated transit system, sustaining efforts to create a metropolitan transit authority with regionally co-ordinated services and unified fares could improve efficiency. Most of the local public transport companies are below optimal size to allow for full exploitation of economies of scale and density. No fewer than 39 local operators offer bus services in Veneto. Such extreme fragmentation calls for merging firms acting in adjacent territories, in the case of small and medium cities, and for disaggregating services to be provided in larger cities (OECD, 2009g). Significant institutional designs have been crafted in several OECD metropolitan areas to achieve these objectives (Box 4.4). Momentum is building for a re-organisation of the transit sector. Indeed, the new bid for a public transport provider in the province of Treviso has seen a proposal from the area's municipalities to offer services in a circular pattern, which would create connections across municipalities in addition to the traditional radial mode of public transport connecting them to the provincial capital city. In support of their proposal, the municipalities have offered to co-fund the expansion of the service.

Inter-regional planning and area-wide transportation districts have gradually been instituted in Veneto. Regarding the former, the most ambitious was the Po River Project (*Progetto Po*) involving Piedmont, Lombardy, Emilia-Romagna and Veneto in the clean-up of the waters of the river, the restructuring of the flood control systems along its riverbeds and the use of river resources. Agreement among the four presidents led to the creation of a Unitary Committee to propose policies and to be assigned a joint technical planning office. On the environmental problems of the Adriatic, Veneto joined Friuli Venezia-Giulia in engaging Slovenia and Croatia in the development of an anti-pollution strategy for this area, through the establishment of the International Alpine-Adriatic Community. In terms of the early focus in Veneto on transport, transportation districts (*bacini di traffico*) were identified encompassing intra-city and inter-city services, the creation in each district of an *ad hoc* consortium of local governments in charge of the actual delivery and the co-responsibility of the region for funding. Overall, this constitutes a respectable start on the part of regional institutions in Veneto, with actions targeted to environmental and mobility issues.

Box 4.4 **Regional transportation authorities in Vancouver and Frankfurt**

TransLink is the organisation responsible for the regional transportation network of Metro Vancouver in British Columbia, Canada, including public transport and major roads and bridges. TransLink was created in 1998 (then called the Greater Vancouver Transportation Authority, or GVTA) and fully empowered in April 1999 by the Government of British Columbia to replace BC Transit in the Greater Vancouver Regional District (now Metro Vancouver). It assumed many transportation responsibilities previously held by the provincial government and is responsible for bus, rail and ferry services in the Metro Vancouver region, covering 21 municipalities (2 077 square kilometres) and serving more than 2 million people. In 2007, the province of British Columbia approved legislation changing the governance structure and official name of the organisation.

With the new governance model, TransLink will be looking to expand its services beyond Metro Vancouver to meet the transportation needs of its rapidly growing population and that of its surrounding region. In place of elected officials, the TransLink Board is now comprised of 11 appointed professionals with expertise in relevant areas, such as finance, transport and labour relations. The board is appointed by the Council of Mayors and is responsible for hiring and monitoring the performance of the CEO and providing oversight of TransLink's strategic planning. Board members are appointed for a three-year term. The Council of Mayors on Regional Transportation is composed of the mayors of the 21 municipalities within Metro Vancouver. The Council appoints the TransLink Board, appoints the Regional Transportation Commissioner, and approves TransLink's 10-year strategic plan, including regional funding and borrowing limits. The Regional Transportation Commissioner is independent of the TransLink Board and approves fare increases above inflation and any proposed sale of major assets. Most importantly, the Commissioner reports to the Council of Mayors on TransLink's performance. Finally, the provincial government has an important role as the body establishing the long-term vision for transportation in the region and contributor of funds for major projects.

The Frankfurt Rhein Main transport authority (RMV) organises the public transport in the area of Rhein Main, which comprises two-thirds of the state of Hessen. RMV also co-ordinates the regional public transport system in close co-operation with local transport organisations. Decisions about transport facilities and tariffs are made at a political level, and the RMV and the local transport organisations implement them. Transport enterprises such as the national railways or bus enterprises are answerable to the RMV through performance contracts. The 130 enterprises within the territory of the RMV are allowed independence in carrying out their contracts and achieving the required performance levels.

Although the RMV does not have its own rail network or materials, it can plan for the construction of new rail networks, stations and material. One of the priorities when the RMV was first created in 1995 was to harmonise about 100 tariff systems that existed in the area that it covered. It created one universal tariff and a single ticket that can be used on all the means of public transport, no matter how many transfers are made. The price is set depending on the number of tariff areas crossed. Every December, the schedules of regional transport in the RMV area are adjusted. The RMV informs the public about any changes in the 14 local transport systems and in the regional transport system.

Source: OECD (2008), *OECD Territorial Reviews: Cape Town, South Africa*, OECD Publishing, Paris.

Metropolitan climate change plans

A lack of horizontal collaboration among municipalities within the Venice city-region has limited the effectiveness of its attempts to combat and adapt to climate change. Carbon-relevant functions, defined economic interchanges, flows of materials and energy,

and transportation between activities and households in the city's core area and localities overlap across multiple jurisdictions. This requires that city officials engage in the sometimes challenging task of co-operation with other local governments. The under-use of inter-municipal co-ordination tools within the Venice city-region poses serious problems for adaptation policies, which typically need to be decided and implemented at a regional scale, such as the water policies covered in Chapter 3. The lack of institutional fit with carbon-related issues has been identified as a key issue for an effective implementation climate change strategy. Although a few examples exist of climate change action plans at the metropolitan level, most notably in London, Hanover and Portland, collaborative inter-urban frameworks for climate change policies and strategies are the exception, not the rule.

Box 4.5. **Cases of metropolitan co-ordination for climate change action planning**

London: In London, the creation of the Greater London Authority in 2000 with a direct elected assembly and mayor provided the opportunity to address climate change at the London-wide scale. Planning responsibility allows the mayor to promote the use of on-site renewable energy generation (micro-generation) and Combined Heat and Power (CHP). In the first term of the mayoral mandate, the Greater London authority formed the London Energy Partnership. This was followed by the introduction of the congestion charge and the approval of policies for addressing the emissions of new development. This momentum led to the development of a Climate Change Action Plan and the creation of the London Climate Agency in 2005 to deliver the policy framework (Bulkeley and Schroeder, 2008).

Hanover: The German metropolitan region of Hanover, a metro-region with about four million inhabitants, benefits from a regional approach to mitigation and adaptation strategies. The Regional Climate Protection Agency (Klimaschutz-Agentur Region Hannover) co-ordinates all climate protection activities throughout the region. In the meantime, the regional association of local governments and Hanover County have been transformed into a new authority covering the metro-region, *i.e.* "Hanover Region" (Region Hannover), and major competences have been transferred to this body.

Portland: Metro Portland (Oregon), which serves the city of Portland, three counties and 25 cities in the region, is in charge of maintaining the Portland area's urban growth boundary and is also responsible for the region's transport system. This is crucial to avoid urban sprawl and a key element in regional mitigation efforts. The city of Portland was the first city in the United States to institute a local climate action. In 2001, Multnomah County followed Oregon's lead and developed a regional strategy (Local Action Plan on Global Warming) covering the city and the county. This strategy includes 150 short- and long-term measures, with the overall goal of reducing CO_2 emissions by 10% by 2010 (Ekelund and Sigurdson, 2007). Portland, like Hanover, is governed by an elected regional body, which may explain the strength of its regional collaboration (OECD, 2006a).

Beyond inter-municipal co-operation in a given geographic area, local governments in the Venice city-region could implement resource-pooling strategies to realise savings through co-ordinated action, such as projects to purchase energy-efficient products for common use. For example, the Clinton Foundation has helped organise a "Purchasing Alliance" of green cities that collectively negotiates discounted pricing agreements for a range of energy-efficient products. The Clinton Foundation, along with Local Governments for Sustainability (ICLEI) and other groups, has also created similar

networks for cities to pool know-how to reduce policy development costs and create uniform environmental monitoring frameworks (Corfee-Morlot *et al*., 2009).

In tandem with metropolitan-level planning, municipalities within the Venice city-region need to mainstream climate change into the policy process. Municipalities may learn from a wide range of cities which have created institutional mechanisms to prioritise climate-related policies. The City of Zurich, for instance, created a special unit for environmental protection in charge of supervising the city's climate policy, with cross-departmental tasks within the city administration. This special administrative unit is responsible for assessing every planned development and construction project in terms of its impacts, and the departments responsible for their implementation need to account for the results of this assessment.[11] Other responses to integrating climate change in urban governance include the creation of a unit in charge of climate change policy within each climate-relevant department, a climate-policy steering group,[12] a climate protection co-ordination group, or an over-arching unit with appropriate competences for mainstreaming climate change policy. In San Francisco, the Office of Climate Protection Initiatives is funded to co-ordinate the multiple climate initiatives undertaken by several programmes, to lobby for climate protection legislation at the federal level, and for example, to work with local private companies to encourage the use of vehicles that run on biodiesel (Corfee-Morlot *et al*., 2009).

Regional co-ordination of cultural infrastructure and tourism

A metropolitan approach could provide clear benefits in the cultural sector. The three provinces have engaged in cultural infrastructure co-ordination to some extent, but additional programmes are warranted. Action is especially needed for the museums in historic Venice, given the limited space and exorbitant cost of archiving their collections. A project could be devised to provide an integrated storage facility on the mainland that would house the archives and many of the three million books on historic Venice. This facility could also exhibit collections of historic Venice in Padua or Treviso, for instance.[13]

A regional tourism policy has the potential to encourage visitors to travel outside the mass tourism circuit and prolong the tourist season beyond the peak periods. A number of regional tourism projects are already being implemented and merit continued support.[14] Of particular importance are the initiatives to provide tourism on the *Litoranea Veneta*, the 600 kilometre-long inland waterway that has "sheltered mariners sailing to and from Venice for more than 2,000 years" (Fox, 2009). Charters that depart from the cities of Chioggia and Grado have untapped potential and could provide an alternative to larger commercial cruises.

Tourism, a critical sector for income and employment generation, continues to be hampered by unresolved problems of tourism governance. Pricing mechanisms and systems for planning and booking visits need to spread visitors across a larger part of the city-region and to encourage them to visit a wider range of attractions. A further approach, being actively pursued in the region, is to encourage the tourism concentrated on the main islands and the Lagoon to spread into other areas, such as the historic university city of Padua and the Palladian villas that dot the countryside. These initiatives would be valuable for employment across the region, replacing declining opportunities in both agriculture and manufacturing. The ongoing closure of many of the environmentally damaging industrial activities at Marghera has given planners the opportunity to design parks and other urban amenities in mainland Venice. Hotels are beginning to be built in

these areas. Existing plans for increasing the number of access points from the mainland, while preserving the quality of both the natural and man-made environment, need to be pursued. These plans deserve full commitment and support in the interests of the entire Venice area and its "liveability".

An explicit regional tourism policy has been hampered by a limited research base on tourist arrivals and the lack of a metropolitan tourism observatory. One of the key gaps is the absolute lack of systematically gathered figures on excursionists. Indeed, policy makers in the Venice municipality are informed by a ratio of overnight stays to day-trippers last measured in an extensive visitor survey in 1988. The calculations for excursionists are still based on a 1:4 ratio of overnight stays to day-trippers. A relatively minor change of this formula could change the tourist figures by a magnitude of several million. The tourist authorities in Venice might revisit their initial figures and repeat the 1988 study, or at least conduct a sensitivity analysis to these calculations. Additional work could be done to institute a tourism observatory, given the limited appeal to the tourism industry of academic tourism studies (Borg, 2009). By and large, these data have not directly fed into public involvement and industry activities to help improve tourism. Examples from OECD cities offer models that facilitate a network for tourism research as one component of improving competitiveness (Box 4.6).[15]

Box 4.6. **Informing better tourism planning: observatories in Vienna and Quebec**

Viennese tourism planners benefit from Austria's TourMIS Marketing-Information-System. The major aim of TourMIS is to provide information and decision support for tourism managers through online tourism survey data, as well as various tools to transform data into management information. Since 2000, this initiative has provided the tourism industry with predominantly free access to data. TourMIS is open to all authorized tourism organisations, societies, tourism consultants, companies, tourism training centres, pressure groups, etc. in Austria and abroad. By covering the maintenance costs, a consortium of the most important initiators of market research projects in Austria and Europe guarantee the continuous updating of the comprehensive database. The programme modules are developed according to the specific requirements of tourism managers at the Institute for Tourism and Leisure Studies at the University of Economics and Business Administration in Vienna. The development of TourMIS is financially supported by the Austrian National Tourist Office and the European Travel Commission.

The Tourism Intelligence Network was developed in May 2004 as a partnership between the Quebec tourism industry and Tourism Quebec to support intelligence gathering in collaboration with the Université du Québec in Montreal. The organisation's purpose is to: "Provide the Quebec tourism industry with a holistic knowledge base to improve industry operations and competitiveness; [and] [h]elp reduce internal competitiveness between organisations by providing a public knowledge base and disseminating it to the complete industry". The Tourism Intelligence Network is a structured industry tool for gathering and analysing information. It regularly monitors changes in tourism around the world and produces brief analyses with value-added information of interest to Quebec decision-makers working in small to medium-sized businesses.

Source: Austrian National Tourist Office (2009), "TourMIS", *www.tourmis.wu-wien.ac.at/index_e.html* and OECD (2008), "Background Report for the High-Level Meeting of the Tourism Committee", Session on "The Tourism Economy and Globalisation: Strategic Issues and Policies", 9-10 October, CFE/TOU(2008)9.

The creation of a think tank to facilitate the emergence of "flagship projects" to Venice might also be considered. This could concentrate on defining possible synergies between tourism and other important sectors within the Venice city-region, and the role that "flagship projects" could play. Tourism could be used more strategically to attract decision makers and experts so that it benefits the manufacturing industry in Treviso and the knowledge cluster around Padua. An eventual bid for the 2020 Olympics, as announced by politicians from the Veneto Region in October 2009, would only increase the need for increased regional co-ordination with respect to tourist infrastructure. The same applies for Venice's bid to be recognised as the European Capital of Culture in 2019. A number of examples from OECD studies show the potential of using a mega-event for urban regeneration. Examples include the renewal of a former industrial area in East London for the 2012 Olympics and the clean-up of a port area for EXPO 1998 in Lisbon (Box 4.7).

Box. 4.7. **Linking brownfields redevelopment to mega-events: the clean-up of Lisbon for EXPO 1998**

To commemorate the Portuguese arrival in India in 1498, Lisbon hosted the World International Exhibition in 1998 and used it as an opportunity to revitalise and beautify a degraded port area. The site housed a majority of Lisbon's industries, including refineries, an armoury, the Lisbon slaughterhouse, a garbage dump and oil company storage warehouses. From this 340 hectare site, approximately 1.1 million tons of concrete from existing buildings was cleared out, and 36 million square metres of contaminated soil was removed or treated. This project took five years to complete and employed between 3 200 and 11 100 workers, depending on the phase of the work. During the exhibition, 10 million people visited the event, in which 146 countries participated.

Today, the area has been transformed into a multi-use neighbourhood, including public parks and commercial and residential use. In what was an almost urban "dead" area, essentially because of its industrial uses, now stands an area equipped with the central and most modern inter-modal station in the Lisbon area, one of the best-equipped and modern hospitals of the city, and some 110 hectares of green areas where 30 000 trees and 70 000 bushes were planted. Approximately 100 000 use the area daily, one-third of whom are residents, one-third commuters from outside the area, and another third visitors from outside the area.

The limits of current co-ordination efforts

The question remains as to how much sectoral co-ordination can achieve in the light, for example, of the particular significance for local identity that some services, such as child care and elderly care, have for local politicians and residents. Localism (*campanilismo*) and historical rivalries among municipalities remain strong and undermine efforts towards inter-municipal and inter-provincial co-operation. Experiments in the governance of large-scale brownfield redevelopment projects have remained within the scale of the province and even of single municipalities. Localist sentiment is fuelled by an asymmetry of power when this is perceived as privileging one municipality over the other or one neighbourhood over another. In the more powerful municipalities, given this power imbalance, localism finds expression in resistance to proposals for co-ordination. Thus, the large cities in Veneto have chosen not to participate in the *Intesa Programmatica d'Area* (IPA) area agreements process that has been soliciting input into regional planning, whereas its smaller cities often take part.

4.5. Towards a metropolitan government?

The possibility of creating metropolitan cities was introduced in the 2001 constitutional reform. The idea is that within the region, these metropolitan areas would have a two-tier administrative structure: the metropolitan city (*città metropolitana*) on the higher tier, and regular municipalities on the lower tier. The metropolitan city would then accumulate provincial responsibilities, with a range of responsibilities considered as supra-municipal, such as spatial planning; transportation; preservation and enhancement of cultural and environmental heritage; water and energy resources; waste management; economic development; health care, education and training services. The metropolitan city would be governed by a council (directly elected), an executive committee (elected by the council) and a mayor (elected by both the council and the committee). It would draw its financial resources from the taxes it levied, from transfers of national and regional government taxes and from user fees. Under the reform, regions were given the power to determine the perimeters of metropolitan areas and metropolitan cities. They had the obligation to consult with the municipalities and the provinces concerned for this purpose, but they were also entitled to modify municipal boundaries by merging or abolishing them.

The creation of a metropolitan government might internalise and resolve some of the conflicts of interest between provinces and cities in the region. Such a body might be considered consonant with joint service provision of utilities introduced in the past and the joint regional transit organisation that was recently created. However, if a metropolitan government took over the responsibilities of the current provinces in the Venice city-region, it runs the risk of becoming relatively weak in relation to a powerful region and relatively powerful cities. In order to be effective, this option might thus require reconsideration of the allocation of responsibilities over the government tiers in Veneto. In addition, municipal mergers might have to be considered in order to simplify metropolitan-local relations. These reforms could involve considerable transaction costs, due to political sensitivity and benefits that are assumed, but for which no *a priori* calculations have been made in the context of the Venice city-region.

A rigorous analytical debate on the arguments for and against the metropolitan city model in Venice has, however, not yet been conducted. This makes rational evaluation of such a model difficult. A form of metropolitan government might work for the Venice city-region under certain conditions. In order to avoid further administrative complexity, it might for example be essential not to create additional government tiers, so the creation of a metropolitan government would have to imply either abolishing or merging the three provinces. The question of the effectiveness of mergers of regional and local governments, and the optimal size of sub-national government in a broader sense, is a difficult one, and studies on the subject do not tend to show unambiguous results. Much seems to depend on the context of the specific case. Given the mixed outcomes of regional and local government mergers in other OECD countries, an assessment of costs and benefits of such an amalgamation in the Venice city-region would be necessary in order to determine its usefulness.

To reduce institutional complexity at the metropolitan level, merging municipalities could be an option. The average number of citizens per municipality in the Venice city-region (10 700 in 2008) is not particularly high by comparison with municipalities in OECD countries (Figure 4.5). The share of municipalities in the Veneto Region with less than 3 000 inhabitants was 34.8% in 2005 (Dalla Zuanna and Tanturri, 2007). It is not clear whether their size is optimal for the provision of such services as child care and

education. Municipal mergers in countries such as Denmark and Finland have been motivated by the need to include a minimum of 30 000 inhabitants per municipality in order to reach the optimal size for municipal service delivery. In the Danish case, the estimation of optimal size has been informed by studies on public sector efficiency in Denmark in different functions such as child care provision, primary and secondary education and basic health care, taking into account the size of local governments. The assumption underlying these estimations is that different local functions have their optimal size, or point at which the population size of the area is large enough to reap economies of scale, but not so large that diseconomies of scale start to come into play. Savings are generally anticipated in administrative expenses, for example, through the closing of town halls and local administrations when municipalities are merged.

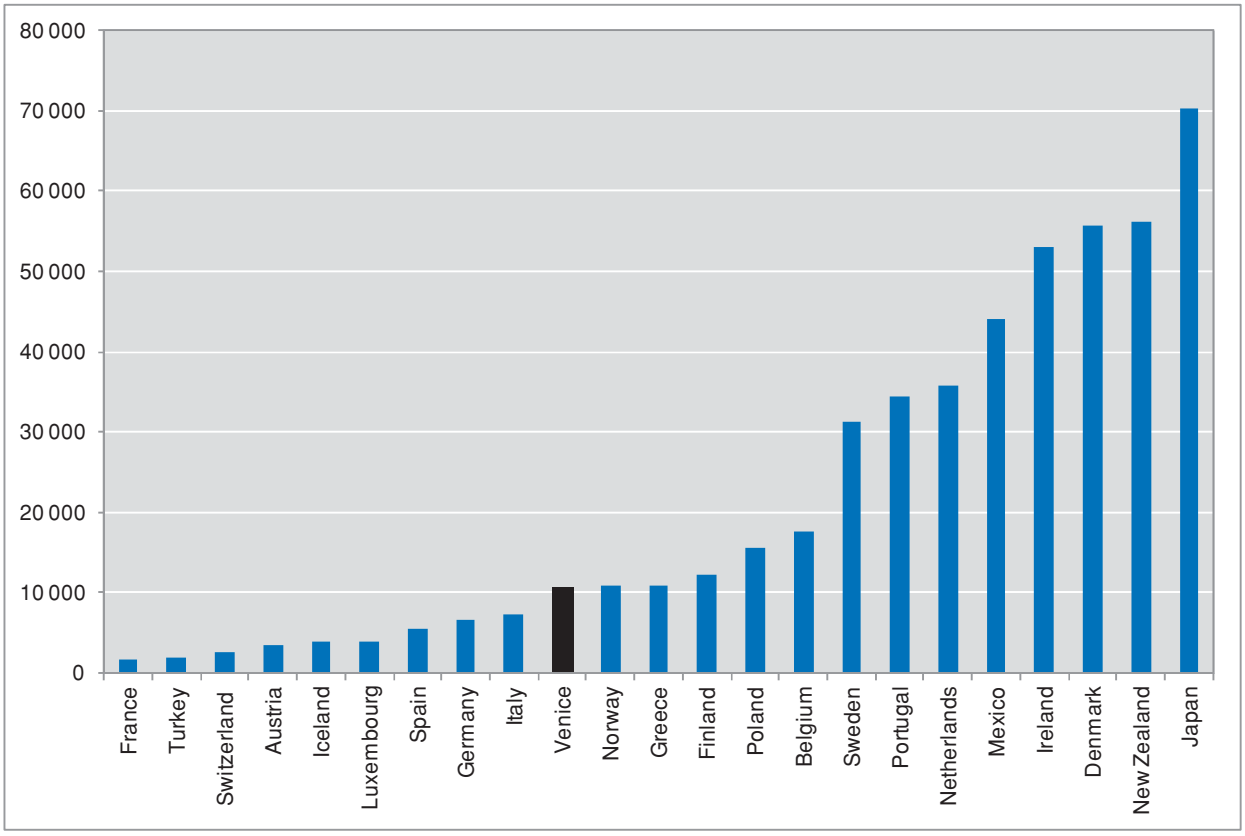
Regional and municipal mergers have, however, been relatively rare in OECD countries, due to the political conflicts they tend to generate: the only six unitary countries in the OECD that have managed to significantly reduce their number of municipalities in the period from 1995 to 2007 have been Greece, Denmark, Japan, Iceland, Netherlands and Finland. The anticipated gains in efficiency were often not forthcoming, as in the case of the merger of municipalities in Toronto in 1998.[16] In some cases, political resistance to amalgamation has led to re-amalgamation, *e.g.* in Montreal, where municipal mergers took place in 2002, only to be followed by a process of de-amalgamation in 2006. Reliable estimates on costs and benefits of mergers, including an assessment of the political support and transaction cost, would be essential for an informed assessment of the merits of municipal mergers as opposed to less radical inter-municipal co-ordination mechanisms. Such information does not appear to exist for the Venice city-region.

The experience of other OECD metropolitan areas shows that introduction of a form of metropolitan government is difficult. Only rarely are metropolitan governments introduced or created, with a few notable exceptions (such as Montreal). A bill was drafted in 2006 to create a metropolitan government level in Milan, but this proposal was never approved.[17] Mergers of regional or local governments have been pursued in some OECD countries, but they are generally politically sensitive and could cost considerable political capital.

4.6. Sub-national finance issues

Public expenditures in the Veneto Region are relatively low, but the costs of ageing could put pressure on budgets. The consolidated public expenditure in the Veneto Region was 36.4% of GDP in 2006, compared to a national average of 48%, the lowest among Italian regions (Figure 4.6). This could partly be explained by strong entrepreneurial activity and the dominant presence of the private sector, but it also indicates lower public spending, as confirmed by other indicators: when public expenditures per capita are considered, the Veneto Region scores below the national average. In 2006, approximately EUR 10 700 was spent per Veneto resident by national and sub-national governments, whereas around EUR 12 000 was spent per Italian citizen. Considering that social services and health make up a large part of the sub-national budget, especially for regions, ageing will in the coming years put upward pressure on the sub-national budgets. Sub-national governments would benefit from flexibility on the expenditure and revenue side to would allow them to adjust to new circumstances.

Figure 4.5. **Average municipal size in selected OECD countries and the Venice city-region**

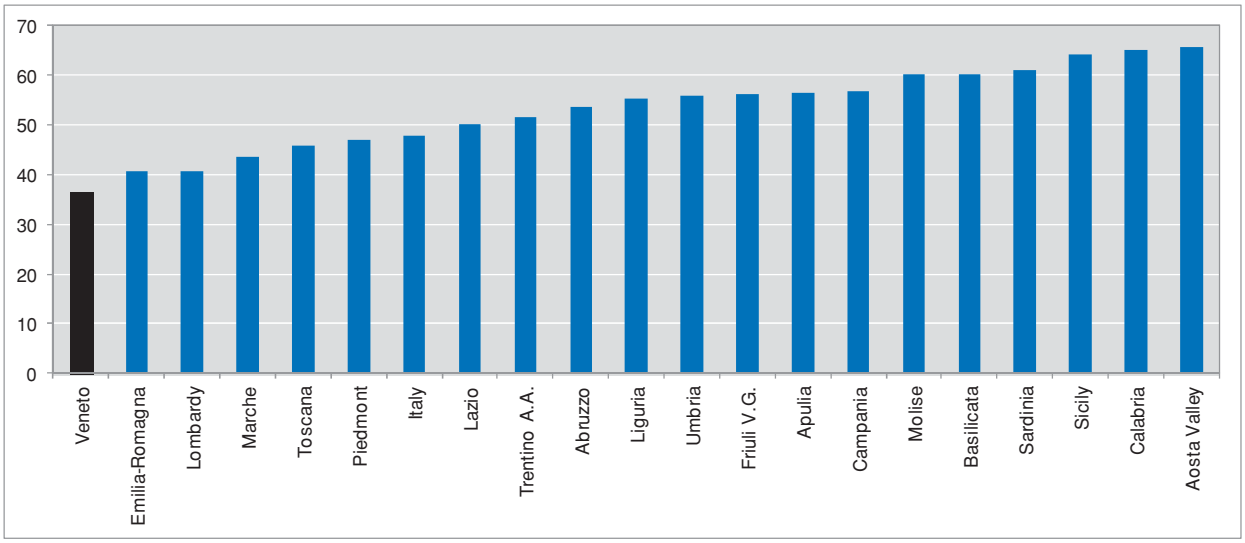


Source: OECD Database on Fiscal Relations across Levels of Government, internal database (2009).

Municipalities in the Veneto region have relatively high budget flexibility, and might be able to adjust rapidly to new challenges. Fixed expenses (personnel costs and loan and interest repayments) accounted for an average of 51% of current revenues of national municipal administrations in 2005, but for municipalities in the Veneto Region, the figure was only 41% (Regione del Veneto, 2008c). The lower figure in the Veneto Region can be explained by relatively lower expenditures on personnel and loan repayment, rather than on particularly buoyant revenue sources.

Flexibility on the revenue side is more limited, especially considering the municipal tax structure in Venice municipalities. Sub-national governments in Italy have a variety of tax sources at their disposal. Regions can levy a business tax (IRAP) and a surcharge on the income tax (IRPEF); provinces have a car ownership tax, and municipalities used to benefit from a municipal property tax (*Imposta Comunale sugli Immobili*, ICI) until it was abolished for first houses in 2008.[18] The abolition of the property tax has to a large extent constrained municipal fiscal autonomy and deprived municipalities of a revenue source that could be used to adapt to new circumstances. Although the loss of such these revenue was partially compensated for by central government grants, the result is a

Figure 4.6. **Consolidated public expenditure by region as a percentage of GDP in 2006**



Source: Regione del Veneto (2008), *Rapporto Statistico 2008: il Veneto si racconta il Veneto si confronta*, Regione del Veneto, Venice, *http://statistica.regione.veneto.it/Pubblicazioni/RapportoStatistico2008/Rapporto%20Statistico%202008.zip*.

municipal tax structure that is decoupled from economic development and its needs. This situation is quite extreme for the City of Venice. Its income from taxation was already heavily dependent on revenue from its municipally owned casino before the property tax was abolished: 57% of its income from local taxation (around a quarter of total revenues) derived from the local gambling tax in 2005. The casino can be considered part of the tourism-related activities, leaving the city with little interest in developing other economic sectors for raising revenue, since any reduction of tourism would reduce its tax revenues from the casino.

The Venice city-region has no mechanism to equalise local revenues according to need or financial capacity. Several metropolitan areas within the OECD have such schemes, to ensure that municipalities are compensated for certain relatively higher costs for services that benefit the whole metropolitan area, or for relatively lower tax revenue bases. This can take several forms: sometimes formulas are used to make sure that government grants to local governments are corrected for different costs and tax bases; in other cases, some of the tax revenues of local governments are pooled in a common fund from which certain spending categories, *e.g.* social spending, is financed (Box 4.8). A similar scheme could be considered for local governments in the Venice city-region, in order to make sure that spending that benefits the whole metropolitan area, rather than a specific location, is borne equitably by the different local governments in the area.

Box 4.8. **Inter-municipal equalisation in Copenhagen and Toronto**

The Greater Copenhagen area has an inter-municipal equalisation system; no central government subsidies are allotted. A municipality in an area whose expenditures are larger than the estimated tax receipts receives a subsidy equal to 27% of the difference between its expenditures and tax receipts. Conversely, a municipality with a surplus contributes 27% to the equalisation scheme. The definitions of expenditure and tax receipts are similar as in the national scheme: for the estimation of the tax revenues, the municipal tax base is used, applying an average tax rate. The expenditure estimations are made using a complex of two different indicators: demographic and socio-economic factors, which make it possible to take into account the different exogenous factors that influence local expenditures. The weights of the different socio-economic indexes are, however, different. The equalisation system transfers EUR 250 million per year to the more needy municipalities within the metropolitan area. Eighteen municipalities benefited from these transfers in 2008, and 16 municipalities contributed into this system. In absolute terms, the largest beneficiary of the scheme was the City of Copenhagen, which received around one-third of the funds transferred.

The horizontal fiscal balance among municipalities in the Toronto region is also supported by an inter-municipal equalisation scheme. This inter-municipal equalisation is carried out under the Greater Toronto Area (GTA) "pooling" scheme. Under this arrangement, the costs of social assistance and social housing in the Greater Toronto Area are paid from a funding source that pools tax revenues of all municipalities. The province announced in 2007 that it would phase out GTA pooling on an annual basis over seven years and remove CAD 200 million in social assistance and social housing costs funded under the programme. The government will provide compensation for the phase-out of GTA pooling to the affected municipalities. At the provincial level, the Ontario Municipal Partnership Fund (OMPF) assists municipalities with their share of social programme costs; it includes equalisation measures for areas with limited property assessment, addresses challenges faced by northern and rural communities, and responds to policing costs in rural communities. The OMPF operates at the provincial level, with funding provided to about half of the municipalities in the Greater Toronto Area.

Although paying taxes has become easier for companies in recent years, government agencies can make additional strides to simplify tax procedures. As reported in the *Doing Business in Veneto 2009* report, "In Padua, a typical medium-sized company makes 15 payments, pays 73.6% of its commercial profit, and spends 351 hours per year on tax compliance. Within the EU, only Poland and Romania make paying taxes more burdensome." Part of the complexity is due to the fact that companies in Italy are required to maintain six separate accounting books for tax-compliance purposes. These compliance procedures especially strain SMEs.

4.7. Participatory governance and civic engagement

Social capital has been as important an asset to the Venice city-region's territorial community[19] as financial, natural and environmental, artistic and archaeological, technological, institutional and human resources are. The longitudinal study of the performance of Italian regions (Putnam *et al.*, 1993), from which the concept of social capital was empirically extracted, demonstrated the connection between the concept of social capital and the results of institutional and socio-economic objectives that social capital contributed to achieve. The study empirically demonstrated how social capital was an independent variable, which explained to a significant degree the differences in

institutional performance across Italian regions, that is, their differential capacity to produce public goods.

Several initiatives have been promoted in the recent past to involve civil society in decision-making processes. The number of citizens' committees and private organisations that seek a dialogue with public decision makers has grown over the years, especially on issues citizens consider particularly important, such as MOSE. Citizens have proved sensitive to decisions on urban planning, transport and mobility, as well as the environment, and local authorities have made efforts to support dialogue to ensure enhanced transparency and build trust. The referendum is among the most valuable tools to encourage such a process: it is facilitated by the Statute of Veneto's Regional Government as well as by those of the provinces of Padua, Treviso and Venice, along with the three main municipalities of the Venice city-region.[20] Citizens can take part in decision-making processes by means of other instruments, such as through the participatory planning tools available in the Provincial Territorial Co-ordination Plans (PTCPs). Box 4.9 shows the extent to which the Province of Venice has been involved with citizen mobilisation.

Box 4.9. **The participation of civil society in decision-making processes in the City of Venice**

In recent years, Venice's municipal government has endeavoured to involve local stakeholders, particularly in the area of policy planning. The process that led to the drafting of Venice's Strategic Plan (*Piano Strategico di Venezia*) demonstrates the successful involvement of institutional representatives of civil society, if not of ordinary citizens. Two other such instances were the attempt to co-ordinate operators in the tourist sector and the city government's initiatives to encourage energy saving, such as the *Cambieresti* project. Citizens can engage in civic life through their representatives in the formal bodies of local government (municipal councils, municipal boards, etc.).

The elaboration of the Provincial Territorial Co-ordination Plans of Venice also sought a participatory approach. Regional Law 11/2004 envisions a two-track approach to participation: the external participation of private and institutional stakeholders (municipalities) and the internal participation of all the institutional provincial departments (*assessorati*). To facilitate the aggregation of organised stakeholder interests and also to ensure some engagement of the citizenry at large, a new process of interest aggregation was designed and implemented and a number of initiatives were taken. The first phase unfolded over a one-year period and entailed meetings in all the province's municipalities, where issues were identified and priorities ranked. Input collected in this way became the basis for the second phase of participatory planning, which saw the preparation of a preliminary strategic document that explained for the public at large the proposed strategic vision and project choices. More meetings then followed with participants, leading to the adjustment of the preliminary document and the preparation of the final document. Altogether, the process in the province of Venice entailed over 200 public meetings. A facilitator was used in the larger meetings to help citizens who preferred not to speak unassisted. Attention was paid to women's participation. To better assess their interests and concerns, an in-depth case study of women's participation was conducted in one of the municipalities and incorporated into the public discussion of the provincial plan.

Source: Comuni di Venezia (2005), *Piano Strategico di Venezia*; Pugliese, T. (2009), "Comments on the Piano Strategico di Venezia", correspondence to the OECD Secretariat.

Citizen participation in the planning process in Veneto is emergent, but could nonetheless be better developed. Law 11/2004 articulated broad provisions for citizen participation, principally in the guise of organised consultation with selected actors. However, this instituted a minimalist approach that allows the individual municipalities to experiment modestly with the concept of participation, rather than act more forcefully to promote wider citizen participation. Because it emphasises the role of organised stakeholders, this approach easily becomes a preferential lane in which the transparency of the negotiations is lost and the content being negotiated is a matter of political exchange. In the absence of an established tradition of engaging civil society in public decision-making within Italy, municipalities have rarely experimented with newer ways to include citizens at large in the process. In this respect, Veneto or the Venice city-region is no better or worse than other areas in Italy. State-of-the-art examples include the "scenario/project construction" mode of the charrette and the issue-focused discussion mode of the town hall meeting. These tools have been successfully employed in the debates for Ground Zero redevelopment in New York City and the Common Ground metropolitan planning effort in Chicago, for example. In the United States, they are also used by large scale private developers and architecture and planning firms. More extensive involvement of citizens at all government levels might increase the quality of policy making, as would full, quick and easy access by the public to all official documents.

Enhancing metropolitan associational networks

The tradition of strong local identity and strong local ties does not encourage actors in civil society in the Venice city-region to act in a concerted fashion. While the inherited endowment of local associations and of their inter-connecting local networks is large, and municipal initiatives often promote their work and growth in number, the picture is not reassuring at the level of the city-region. The local predominates, reaching up to the provincial level, where most associations are still based, but it rarely goes beyond. This limits the impact and significance of the networks in this period of economic crisis, and more generally in the face of the ongoing process of globalisation and the need for metropolitan governance.

The governance of the Venice city-region today needs associations organised into territorial networks beyond the local and provincial levels. The networks created 30 and 20 years ago are now apparently insufficient. For example, the production of applied new knowledge needs to be ensured through educational and research services acting with sectoral associations, not by the *ad hoc* and personal level of imitation of the work of others as the channel of transmission. The diffused and integrated industrial production sites (and their very local basic groups) cannot partake of just a free knowledge system and at the same time ensure that it is of the high content necessary. It is networks at the larger scale which begin to address the new pressing demand for knowledge for a knowledge-based economy by interacting more effectively with institutional networks.

Despite the strong concentration of artists and creative people in the Venice city area, they lack both a political body to voice their concerns and a body of statistics that could demonstrate their contribution to the regional economy. Considerable regional co-operation already occurs in specific industries, such as the theatre, but the arts community has not formed an association to explore its common goals and the possibility of joint projects. Artists in the Venice city-region may wish to adopt a task force model, such as that developed by artists in San Francisco (Box 4.10).[21] This could help them call

attention to the need for regional arts infrastructure. The San Francisco Arts Task Force participated in a nationwide study conducted by Americans for the Arts entitled *Arts & Economic Prosperity III: The Economic Impact of Nonprofit Arts and Culture Organisations and Their Audiences*, which documented how the non-profit arts and culture industry is an economic driver in communities, providing jobs, generating revenue and attracting tourists. The project employed a customised input-output analysis model for each of the participating communities to determine the local economic impact of their non-profit arts and culture organisations.[22] In San Francisco, the arts community were responsible for expenditures of USD 1 billion, accounting for 27 837 full-time equivalent jobs and USD 93 million in local and state tax revenues in the 2005 fiscal year (Americans for the Arts, 2007). If artists in the Venice city-region were to emulate such an approach, they could better identify their actual economic contribution.

Box 4.10. **San Francisco Arts Task Force**

The San Francisco Arts Task Force was formed to look afresh at the infrastructure and priorities governing San Francisco's investment in a USD 1.4 billion arts industry. It had been nearly a decade and a half since an official body reviewed the City's arts support infrastructure, and many were concerned that shrinking federal and state funding of the arts, coupled with sky-rocketing housing/arts space costs, meant that the city had to take a different approach to arts funding. With appointments by the Mayor and the Board of Supervisors, the Task Force included dancers, actors, writers, musicians, painters, producers, curators, designers, filmmakers, administrators, union representatives, foundation officers, City officials, and other arts industry professionals.

The Arts Task Force convened in April 2005 and held 21 regularly scheduled public meetings through January 2006. The Task Force also held a citywide town hall, district town halls, and special outreach meetings in order to solicit public input. During the meetings, Task Force members heard from community members, current stakeholders in the arts system, representatives from other city departments and private funding organisations. The Task Force publicly discussed, investigated and made recommendations to the Board of Supervisors and mayor on how to update/restructure the various elements of the City's agencies, programmes, policies and priorities concerning the arts in San Francisco.

The evaluation uncovered a fragmented and isolated arts infrastructure that is under-funded and underutilised. Consequently, they issued a number of recommendations, including:

- A return to strong financial support for the arts.
- A re-organisation of the arts infrastructure into a co-ordinated body. This includes the creation of an new evaluative body to provide assessment, advocacy and advice.
- The return of a substantial Neighbourhood Arts Programme. The City's current investment in the arts is insufficient to reach to all neighbourhoods. Expanding this programming will enhance the diversity and availability of the arts in San Francisco.
- The expansion of the cultural centres programme to offer the benefit of community arts and culture to all parts of the city. By funding cultural space throughout the city and coupling this with increased artist residences and programming grants, the City will dramatically increase creative and economic opportunities in neglected areas.
- Creation of a development staff to facilitate new partnerships between the arts agencies, other city departments, the for-profit and non-profit arts industries, and to develop new sources of funding.

Box 4.10. **San Francisco Arts Task Force** (*cont.*)

- Creation of a land use programme to fund the arts from Redevelopment and Planning initiatives, along with new affordable housing and studio opportunities to keep San Francisco artists in San Francisco.

While such a diverse group inevitably produces a healthy variety of opinions on the many topics addressed, this report made its recommendations about revenue, programmes and the structure of the City's arts agencies with a shared vision of improving the City's arts industry, expanding the resources available and maximising the impact of the arts on all San Francisco's citizens.

Source: Walker (2009) and San Francisco Arts Task Force (2006), "San Francisco Arts Task Force Findings and Recommendations", *http://sfgov.org/site/uploadedfiles/sfac/Arts_Task_Force/supporting/2006/SF_ArtsTaskForceReport.pdf.*

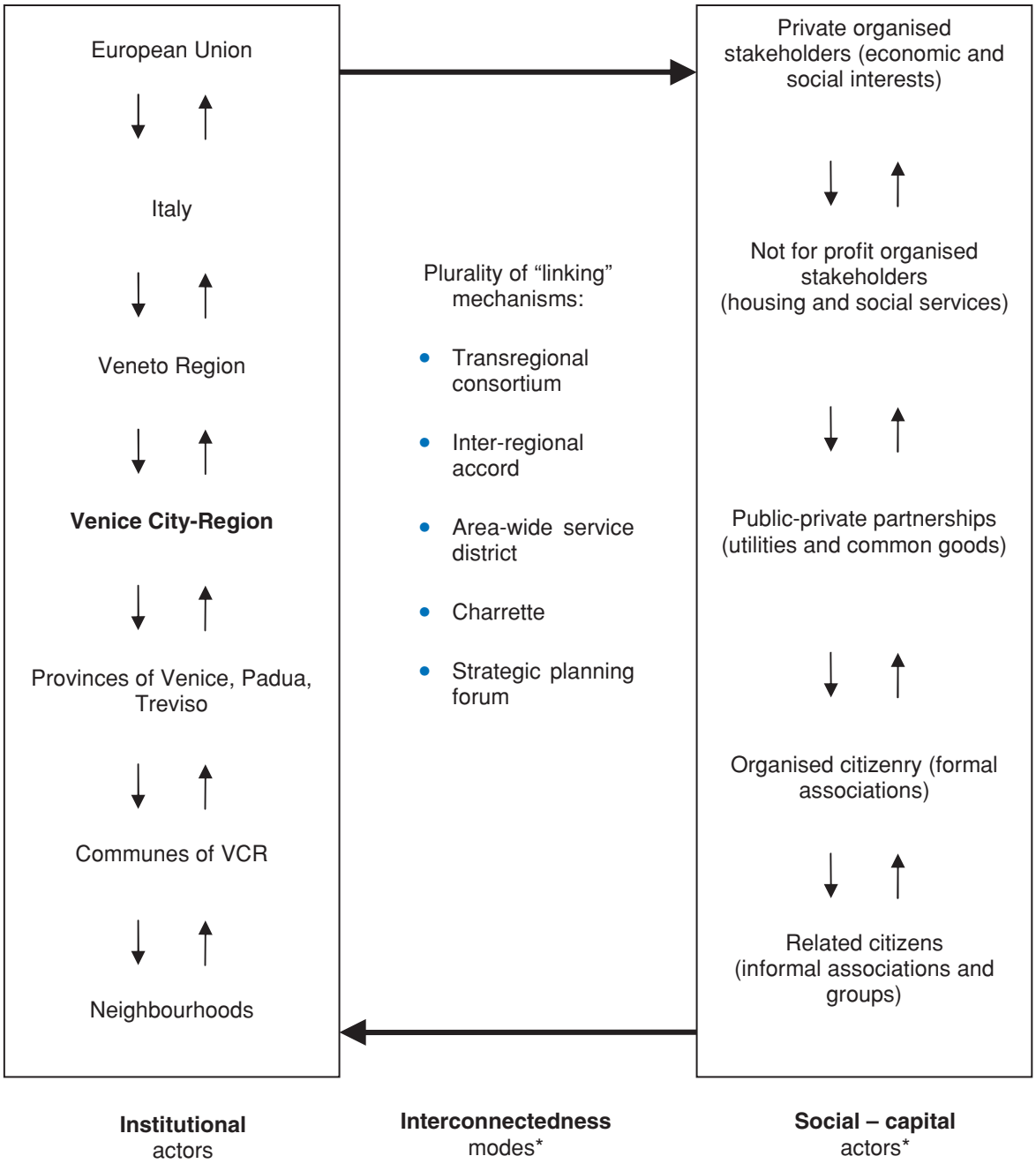
4.8. Towards improved multi-level governance

The current metropolitan governance mechanism is mostly based on inter-municipal co-operation. Although this is a practical arrangement that could bring benefits when all actors concerned want to co-operate, it is difficult to achieve results when interests and visions diverge. Considering the increasingly polycentric nature of the Venice city-region, and the oppositional political tendencies of the different government tiers within the area, there appear at present to be limits to the possibilities for co-ordination. The regional level could play a stronger role as a mediator to guide and shape local policies to help achieve the new vision and goals of the plans. One exception is the environmental sector, where strong mandates from the European Union have allowed for a more pro-active stance in the enforcement of standards of co-operation and environmental improvement. Consequently, inter-municipal co-operation is emerging in the area-wide provision of environmental services, since results have to be shown and measured, but also of cultural services. Examples have already appeared of functional organising of stakeholders at the inter-municipal level reaching beyond provincial boundaries. Although the Venice city-region is an emerging inter-connected network of public actors (Figure 4.7), the Region could play a larger role in shaping metropolitan co-ordination.

The Veneto Region, the municipalities and the three provinces comprise the three pivotal levels in the Venice city-region that could construct an inter-connected network of metropolitan governance in the medium term. It is not likely that an additional layer of formal government will be inserted between the region and the province to give autonomous political expression to the metro-region in the foreseeable future; nor has an analytical or political consensus crystallised around the replacement of the three provinces with one metropolitan city. Organisational reform would be more pragmatic if it concentrated the role of *ad hoc* and task-specific entities. Networks of cities hold uncapitalised potential for the Venice city-region.

Figure 4.7. **The defining elements of multi-level governance for the Venice city-region**

Actors and inter-connectedness



Notes:

* Listed are only selected examples.

The two structural elements of multi-level governance, the institutional actors and the social-capital actors, are shown in the diversity of participants. The concept of vertical and horizontal connectedness is expressed by the arrows, downwards and upwards, within each of the two structures; while the mechanisms through which connectedness is realised is expressed by the horizontal arrows linking the two.

The role of the region could be increased in the formulation and implementation of a strategic agenda for the Venice city-region. The current Territorial Development Strategy could be extended towards economic development, including its main determinants, such as innovation, skills and social integration. The Region might direct more investment, incentives and support towards programmes that stimulate metropolitan alignment and co-operation. Considering the relatively powerful position of the three cities, there will be a need for increased vertical co-ordination between the region and local governments. A common strategic agenda and sector-specific vertical agreements, as applied in other metropolitan areas in the OECD, are instruments that could be applied more frequently in the Venice city-region as well. Co-ordination might be strengthened by introducing more incentives for co-operation by higher orders of government. In the short term, measures worth considering are performance standards, diffusion of best practices of area-wide policy and service agreements, institution of awards for best practices and the facilitation of experimentation and pilot projects with area-wide policy co-ordination and service provision. In addition, regional transit could be enhanced by the creation of a metropolitan transit authority, which could introduce a unified fare system and regional approaches to travel information, marketing and better connectivity between transit options in the region.

In conclusion, which structures of governance in the Venice city-region can meet the challenges of sustainability and prosperity, and how much change can they achieve? There is convincing evidence that an adapting "diffused metro-governance model" is already emerging, institutionally fed from the grass-roots, with the regional level in the growing role of moderator and interlocutor. The provinces' role is to facilitate the densification of area-wide initiatives in policy proposal and service delivery, by acting incrementally and in unison. Additional reforms, such as those mentioned in this chapter, could improve metropolitan governance, making it more resourceful and resilient.

Notes

1. The relevant literature distinguishes different metropolitan regions, each tied in with different economic and global networks: the *global cities* at the pinnacle of the world economy, which concentrate the command economy functions; the *international capitals*, which leverage the positional advantage of national administrative hubs with a significant economic base of advanced services that are internationally interconnected; and *regional capitals,* which build on a relative distance from the network of international capitals and achieve functional prominence by internationally interconnecting the larger region to which they belong (Sassen, 2000; Castells, 1989).

2. This quote borrows from Nanetti (1990).

3. Trans-European Corridor 5, the rail and road network that the European Union is committed to building by 2015, was first pinpointed during the Pan-European Transport Conference in Crete (1994) and later in Helsinki (1997). Corridor 5 is a major east-west artery linking Barcelona (Spain) and Kiev (Ukraine). The multi-modal Pan-European Corridor 5 is planned along three axes. The *a* axis is Venice-Trieste/Koper-Ljubljana-Budapest-Lvov (Ministry of Foreign Affairs of Italy, 2009).

4. The regional administration has launched a collaborative network among different decision makers (regions, provinces, municipalities) on land use planning. An informal roundtable (*tavolo di partenariato*), instituted by Law 11/2004, Art. 50, has aimed to co-ordinate territorial planning between different levels of government.

5. The implementation and definition of rights to build on specific plots is assigned to the Development Plan (*Piano degli Interventi*, PI).

6. In Veneto, where industrial expansion has continued since the 1970s (Brunetta and Segre, 1977), two regional laws in the 1980s permitted the enlargement of productive and commercial buildings (1/1982) and facilitated the urban land conversion of agricultural land (24/1985). The impact of these laws had multiplier effects throughout the area (OECD, 2001).

7. A strong spatial transformation is under way around historic Venice: a couple of million people live in an area that in recent years has been reconstructed in a simple hexagonal geometric shape, bounded by the cities of Chioggia, Padua, Castelfranco, Treviso, San Donà and Mestre. The historic centre of the city of Venice is both the matrix and the complement of this area: it is now part of a complex city, like the historic centre of Amsterdam in the Dutch Randstad. Exactly as in the Randstad, but on a smaller scale, the Venetian "rim city" has no centre, but includes different locations with specialised functions located along the rim: a large industrial port area (Port Marghera, comparable to Rotterdam), an intercontinental airport system (Tessera, comparable to Schiphol), a city for major government functions (Mestre/The Hague), a city of world culture (Venice/Amsterdam), a place of design and creativity (Treviso/Eindhoven) an important university system with a long-established central university (Padua/Utrecht), the widespread presence of SMEs and a powerful farming core, and soon also a kind of Afsluitdijk, the MOSE global

seaward defence system. The network of road connections currently consists of three urban motorways and a five-line metro rail system, plus an intense network of arterial as well as minor roads. The territorial system taking shape includes an important place of urban regeneration in the post-twentieth-century structure of Mestre. A unique opportunity for a significant urban recovery project, the challenge is to "restore" a recently built city. This daunting task has been taken on by a major non-profit private foundation, Fondazione di Venezia, which is restructuring a one-hectare area in the city for cultural, commercial and management purposes, with the aim of making it the centre of the hexagonal city, and the possible capital of an even more extensive Euroregion.

8. For additional material on this public policy process, see Corfee-Morlot *et al*. (2009).

9. Other "regionalist" parties had previously featured in the Italian political system, at the national as well as regional and local levels, although they were expression of the linguistic and cultural interests of the five "special" regions (border and insular regions) acknowledged by the Italian constitution. Examples are the Union Valdôtain in Valle d'Aosta and the Sardinian Action Party.

10. In the 2005 regional elections, Forza Italia, Lega Nord, Alleanza Nazionale, UDC, and Nuovo PSI supported the winning candidate. In the 2010 regional elections, Lega Nord, Il Popolo della Libertá, and Alleanza di Centro Democrazia Cristiana supported the winning candidate.

11. To guarantee that this model works properly requires, first, strategic plans comprising sectoral targets, policies and measures (such as the combination of a general master plan for the environment and a specific master plan for energy in the city of Zurich); and, second, a project-based approach that prevents departmental segregation.

12. California is moving toward the idea of cross-institutional networks. This is being done, in part, through the Climate Action Team charged with co-ordinating action among different departments, actors and interests (Rabe, forthcoming). The Climate Action Team is composed of members of the California Environmental Protection Agency (CalEPA), the Business, Transportation and Housing Agency, the Department of Food and Agriculture, the Resources Agency, the Air Resources Board, the Energy Commission and the Public Utilities Commission. The Secretary of the CalEPA heads up the team. The Climate Action Team is required to report on progress towards meeting the state-wide greenhouse gas targets.

13. Several cities in the OECD have adopted regional approaches to the cultural sector, which might provide resonance in the Venice city-region. An example of this approach is in the Netherlands where the Ministry of Education, Science and Culture observed that developing a cultural policy without reference to other economic sectors and land use planning does not maximise the potential benefit to be drawn from cultural funding (OCW, 2006). Likewise, the Association of Provinces (IPO) has argued that regional development should integrate the creative and cultural sectors in the interests of improving the urban environment (IPO, 2005).

14. These include the following four project types: lagoons and hinterland (six projects carried out), walled towns and fortifications (26 projects carried out), Venetian villas (19 projects carried out), and river routes and systems (11 projects carried out).

15. Insights from this paragraph were drawn from Borg and Russo (2001) and Borg (2009).

16. A KPMG report written before the merger process estimated that the amalgamation process could result in cost savings of CAD 865 million in three years. The amalgamation of Toronto seems instead to be seen as a classic case of an amalgamation that did not result in cost savings. Savings on policies were unexpectedly small, since 70% (in terms of expenditure) were already realised at the level of Metro Toronto. The chief cost savings were expected to come from staff reductions. Although 2 700 positions were eliminated during 1998-2002, 3 600 positions were added over the same period to improve service levels. Salaries and benefits were harmonised upwards, outweighing any cost savings of the amalgamation. Moreover, considerable transition costs were incurred (Slack, 2007).

17. The name of the bill is the *Proposta di Statuto della Città Metropolitana Milanese*. See *www.officinadellambiente.com/files/articoli/alle/1078.pdf* for more details.

18. Luxury properties and historical buildings are still subject to ICI and second homes (whether for Italians or foreign home owners) are taxed as before.

19. The terminology "territorial community" is intentionally used here because it is the most inclusive in comparison to other definitions of "community" found in the literature. "Territorial community" refers to the range of actors sharing a spatial entity which is institutionally defined and so acknowledged, from a neighbourhood, a city and all the way to the supra-national dimension such as the European Union. The "territorial community" includes other "communities" which identify themselves because, for example, they partake of common interests (issue-based communities), or belong to the same ethnic stock (ethnic-based community) or share another common dimension.

20. These each have specific rules. For example, the Statute of the Province of Venice will facilitate a referendum when it is requested by *i*) two-thirds of the members of the Provincial Council; *ii*) 2% of the citizens registered in the poll lists of the municipalities in the province of Venice; or *iii*) by at least five municipal councils, which must represent 5% of the population residing in the province of Venice.

21. A copy of the San Francisco Arts Task Force Report can be viewed at *http://sfgov.org/site/uploadedfiles/sfac/Arts_Task_Force/supporting/2006/SF_ArtsTaskForceReport.pdf*.

22. For additional material on this publication, see *www.americansforthearts.org/information_services/research/services/economic_impact/default.asp* and *www.americansforthearts.org/information_services/research/services/economic_impact/005.asp#calculator*.

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