Boletín de la Asociación de Geógrafos Españoles N.º 61 - 2013, págs. 181-193
I.S.S.N.: 0212-9426

THE GREEN BELT OF VITORIA-GASTEIZ. A SUCCESSFUL PRACTICE FOR SUSTAINABLE URBAN PLANNING

Itziar Aguado
Departamento de Geografía, Prehistoria y Arqueología. Universidad del País Vasco (UPV/EHU)
itziar.aguado@ehu.es
José M. Barrutia
Departamento de Economía Financiera II. Universidad del País Vasco (UPV/EHU)
josemaria.barrutia@ehu.es
Carmen Echebarria
Departamento de Economía Aplicada V. Universidad del País Vasco (UPV/EHU)
carmen.etxebarria@ehu.es

ABSTRACT

Vitoria-Gasteiz can be considered to constitute a good example of sustainable urban development, as the numerous national and international awards received for its environmental quality actions demonstrate. The star project however is the Green Belt, a network of natural parks surrounding the city that was selected by the UNO as one of the 100 best projects at the Third International Competition of Good Practices. The aim of this paper is to analyse the efficiency of the measures adopted and establishing aspects for improvement, whilst pointing out the future dangers to avoid.

Key words: Sustainable Development, Urban Planning, Green Belt, Landscape Planning.

RESUMEN

Vitoria-Gasteiz se puede considerar un buen ejemplo de desarrollo urbano sostenible como demuestran los numerosos premios recibidos por su actuación para la mejora ambiental. Sin embargo, su proyecto estrella es el Anillo Verde, una red de parques naturales que rodean la ciudad y que fue seleccionado por la ONU entre los cien mejores proyectos

Fecha de recepción: junio 2011.
Fecha de aceptación: diciembre 2012.

en el III Concurso Internacional de Buenas Prácticas. El objetivo de este artículo es analizar la eficacia de las medidas adoptadas, así como proponer aspectos de mejora y llamar la atención sobre los futuros retos.

Palabras clave: Desarrollo Sostenible, Planeamiento Urbano, Anillo Verde, Planeamiento del Paisaje.

I. INTRODUCTION

The sustainability concept has now become a leading paradigm of urban planning, but although the practices, discourses and ideologies associated with the sustainable city have been widely disseminated, good practices remain surprisingly scarce. Indeed, demographic trends and subsequent demands for new housing make suburbanisation processes widespread and subject the landscape around cities to increasing pressure. Natural biodiversity reserves, valuable agricultural land and spaces for citizenship leisure are being lost on city-edge areas. Natural habitats are frequently fragmented as a result of land requisitions demanded by infrastructures and such pressure leads to their break up and an irreparable loss of biodiversity.

In response to this, some demand that these areas be preserved and stress the need for them to be properly planned and restructured so as to protect the landscape and preserve biological wealth. Issues relating to the shape, size and isolation of natural or semi-natural area remnants must be studied to determine impacts on ecological processes and diverse species. In this regard, several studies link sustainability to the spatial pattern proposed by green belts (Yokohari et al., 2000; Lindsey, 2003; Brown et al., 2004; Yang and Jinxing, 2007). These spaces can also be used for making places greener, healthier and more liveable in and for promoting more responsible citizenship in relation to environmental questions (Kahn and Abbasi, 2000; Mortberg and Wallentinus, 2000; Beatley and Manning, 1998). So, focusing upon one example of urban development in practice, this paper explores the contributions of the Green Belt in Vitoria-Gasteiz to local sustainability. The paper is divided into three sections: firstly, we introduce the study area relating to the city with its practices to achieve sustainability; we then proceed with the Green Belt project, laying out its stages and goals, and assessing its positive and negative issues; finally, we display our conclusions.

II. GREEN BELT HISTORY

The sustainable city has often been identified with the compact city, higher density development and mixtures of land uses within developments (Brown et al., 2004). This compactness was assured before the Industrial Revolution, as restricted transport prevented cities from spreading. Thus, as time went by and populations rose, cities became more dense, aggravating the wretched living conditions that already existed. After the demolition of most European city walls in the 18th and 19th centuries, the now free spaces were set aside for the creation of promenades and recreational areas for town and city dwellers in order to improve the quality of life and to green up polluted industrial cities. This perhaps constituted the earliest beginnings of green belts, since these areas were established as a planning notion to separate cities from the countryside and to provide citizens with recreational areas.

But the principal origin of green belt movements is to be found in the idea of preserving an undeveloped zone around urban centres, proposed by Ebenezer Howard's famous plan for a Garden City at the end of the 19th century (Howard, 1898). In his work, Howard transferred the radial-concentric shape of medieval cities into growing industrial city regions. Garden Cities had to strictly limit growth and be surrounded by an agricultural and recreational zone, called a Green Belt. The initial function, then, was to ensure open space for agriculture near urban settings and to limit urban growth and preserve rural areas (Yang and Jinxing, 2007). However, the roles of these greenbelts have changed and become more significant (Bengston and Youn, 2006).

Green belts are set up following the traditional approach whereby they are understood to be separators between the central city and suburban communities, between urban and rural areas. But they could perform another role in structuring cities, operating as the connectors of spatial units, a possibility which was not taken into account in the initial approach because it ignored the active flows and interrelations between urban and rural areas (Kuhn, 2003).

At an urban level, some initiatives materialised based upon the model proposed by Howard, creating the Garden Cities of Welwyn and Letchworth in the United Kingdom, or Radburn in the United States. But the most remarkable effort made in this direction was the introduction of these ideas in the sphere of Regional Planning. The first governmental proposal was made by the Greater London Regional Planning Committee in 1935, aimed at providing a reserve supply of public open spaces and recreational areas. This proposal was first incorporated into a development plan in London in 1947, under the Town and Country Planning Act. Thereafter, several green belt initiatives have been implemented, including the Greenbelt of Ontario, Ottawa, the Netherlands' Green Heart, and the Copenhagen Finger Plan. In all of these, recurring themes emerge: the capacity of green belt plans and policies to evolve and address the contemporary needs of society; continued pressures for urban growth and associated infrastructure; the opportunity for restoration and enhancement of natural areas; and attempts to encourage public commitment to local green belts. Today, then, this instrument is amply disseminated all over the world and is even one of the concepts most commonly applied to Asian mega-cities in order to control urban sprawl (Yokohari et al., 2000).

Green belts, therefore, are proposed to control urban sprawl and to foster more sustainable land use, but as many authors have suggested, a green belt by itself cannot stop urban sprawl (Hall et al., 1973; Mills, 2002; Pendall et al., 2002); consequently, it is more important to focus on other green belt functions and support this practice with other kind of tools within the frame of a more integrative package.

III. STUDY AREA

Vitoria-Gasteiz, the administrative capital of the Basque Country (Spain), is a medium-sized compact city of some 240,000 inhabitants, located within a flat area with a spread of small towns nearby. The city is bordered by the Zadorra River to the north and the Vitoria Mountains to the south. It occupies a central place on a plain offering large fertile areas for agricultural uses. The industrial sector has a very significant weight as well due to the industrial processes that took off in the sixties. The whole area takes in a variety of activities,

with a mix of residential-urban, industrial-urban and agricultural uses that are distributed concentrically, with the forestry areas lying furthest from the centre. Vitoria-Gasteiz is located where the Atlantic and Mediterranean bio-geographical regions meet, resulting in a high degree of ecological wealth of great diversity, where habitats such as agricultural mosaics, riverside woodland, grassland areas, wetlands, isolated woods and extensive forest masses come together.

The idea of sustainability is assumed as a given within many practices and measures carried out by the authorities, and the local governments have for a long time made significant efforts to improve habitability and, therefore, the quality of life of all citizens. The city was, in fact, the first city in Spain to develop Local Agenda 21, while its recent mobility plan for the city has won approval for establishing a set of measures including free bicycle hire, an extensive bike-pedestrian network, and investment in a public transportation system combining tram and bus. Another noteworthy feature is to be seen in efforts to provide all neighbourhoods with green areas and public services such as civic centres, sports facilities and educational facilities. For all this, the city was given the European Green Capital Award for 2012.

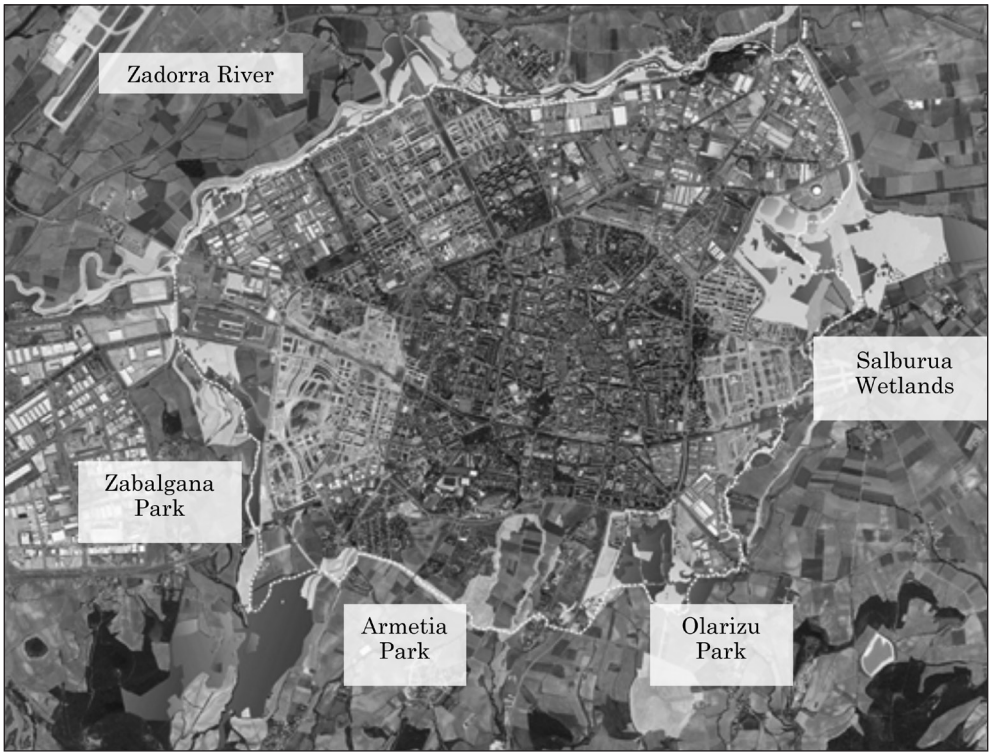
Additionally, because of the dynamic production structures, characterised by the strong pull of the industrial sector and the increasing weight of trade and tertiary activities, the average citizen enjoys a high quality of life. But over the last decade the city has witnessed an unprecedented expansion of the urbanised area. New neighbourhoods have been built up in the peri-urban area and the city has lost some of its compactness and its well-defined limits, all of which has produced a negative effect. However, despite increasing pressure on the peri-urban area, the city maintains good urban planning practices and a high quality of life and has achieved several prizes and international recognitions for its sustainable practices in different areas, as the Green Capital Award testifies.

IV. THE GREENBELT PROJECT OF VITORIA-GASTEIZ

The idea of creating a green ring around the city of Vitoria-Gasteiz was conceived in the eighties, when after years of improper practices, the degradation of the area became alarming. The project is understood as a set of peri-urban parks (the Salburua wetlands, the open land of Olarizu, Armentia forest, Zabalgana Park with its oak grove, the riverside park of Zadorra and the future parks of Alegría and Errekaleor) linked by ecological corridors. The Green Belt of Vitoria-Gasteiz fits in, accordingly, with the greenway concept as defined by Ahern (1995); a network formed by green areas and green corridors which serve as linking instruments.

Resulting from an ambitious project aimed at restoring deprived peri-urban areas and combating un-friendly environmental practices, the main legal precedent for this action was seen in 1986 with the approval of the General Urban Development Plan (known as PGOU –Plan General de Ordenación Urbana–), which proposed that 300 ha. of land surrounding the city be restored and joined to a large already-existing green area (Marañon, 2001). The idea of creating the Green Belt finally came together at the beginning of the 1990s in the search for a global solution to confront the degradation and problems that afflicted the fringe areas of Vitoria-Gasteiz. Today the green belt perimeter measures 35 km (Andrés Orive, 2009) and the whole future area as projected will cover a surface of 1000 ha. (CEA).

Figure 1
THE VITORIA-GASTEIZ GREEN BELT



Source: Environmental Studies Centre of Vitoria-Gasteiz (CEA).

Most of the lands needed are under public ownership, while the rest were compulsorily included in the project under the denomination of General Systems, classified as land unsuitable for urbanisation within the General Urban Development Plan. This made it less expensive to acquire land and allowed the local authorities to control the planning process. The disadvantage, however, was that it was necessary to wait for an interim plan for to go ahead with development, because the General Plan constituted only guidelines for action.

4.1. Project targets

We can picture Vitoria-Gasteiz as encompassed by three concentric circles: the first, the urban environment; the second, the Green Belt; whilst the third circle is dominated by farmlands, forestry and mountains. The second circle, the peri-urban area, went through a marked process of deterioration in the second half of twentieth century. The strategy followed to promote the conservation and restoration of these peri-urban spaces was the creation of a natural continuum around the city, integrating the city's peri-urban parks within the urban layout and connecting them at the same time with the natural environment. A

comprehensive integrated solution was adopted for these spaces that were characterised by a unique problem deriving from their location on the threshold of both the urban and rural domains, encouraging the conservation of natural values and biodiversity (de Juana, 2003).

However, not only ecological targets but also social and economic goals were taken into account. The promotion of these spaces for public use was encouraged, satisfying local people's demands for outdoor leisure areas and fostering environmental awareness and education. This meant that local citizens were more likely to get involved in the conservation of such spaces.

4.2. Actions undertaken

The origin of the project goes back to the General Urban Development Plan of 1986 in which the local government proposed to complete the General Open Spaces System through the addition of almost 300 hectares of natural reserves consisting of forested parks bordering the city. Other surfaces were incorporated, belonging to the Provincial Council and to the Administrative Councils of the towns of Arcaya, Arcaute and Elorriaga (rural towns next to Vitoria-Gasteiz), as well as by means of the expropriation of private land. Since 1992, a large number of specific actions have been undertaken in each of the parks to improve both the natural value of the area and its adequacy for public use. The project started up with the restoration of particular degraded areas where abusive practices had been taking place, including abandoned gravel pits, illegal vegetable gardens and sheds, unauthorised dumps of sewage and solid waste, and the introduction of non-native fauna and flora. The ecological interest of the area is high, but perhaps the most outstanding function is its social role, since this project seeks to increase public awareness of environmental issues.

The project encompassed several existing natural areas of value, including the Zadorra River to the north, the Salburua Wetlands to the east and Armentia Forest to the southwest. The design of the network comprises the creation of trails through the different parks and infrastructures and facilities for leisure and environmental education initiatives, such as the ornithological observatory, the Centre for Environmental Studies (CEA), the organic vegetable gardens or the new Nature Interpretation Centre (Ataria).

One of the most relevant measures has been the recovery of the Salburua wetlands, the richest site within the Green Belt in terms of biodiversity due to its nesting and wintering areas for aquatic birds. The restoration of these wetlands, which had practically disappeared owing to a draining process employed in the past to make these lands farmable (see Figure 2), has managed to recover more than 60 hectares of flooded land where more than 300 breeding pairs of aquatic birds, 2000 specimens of wintering species and some animal species of extraordinary interest such as the European mink, the bittern and the agile frog have been reintroduced (de Juana, 2003). Deer are the only species to have been artificially introduced to contribute to the area's conservation. In wetlands, vegetation grows fast and deer are therefore used to prevent it from growing out of hand, thus sidestepping the introduction of heavy machinery for grass cutting and the accompanying processes of erosion and soil compaction such machinery causes. Thanks to the actions undertaken this area was included in the Ramsar International Convention on Wetlands in 2002 and has been declared an SAC (EC Special Area of Conservation) (Lobo, 2006).

Figure 2
THE RESTORATION OF THE SALBURUA WETLANDS

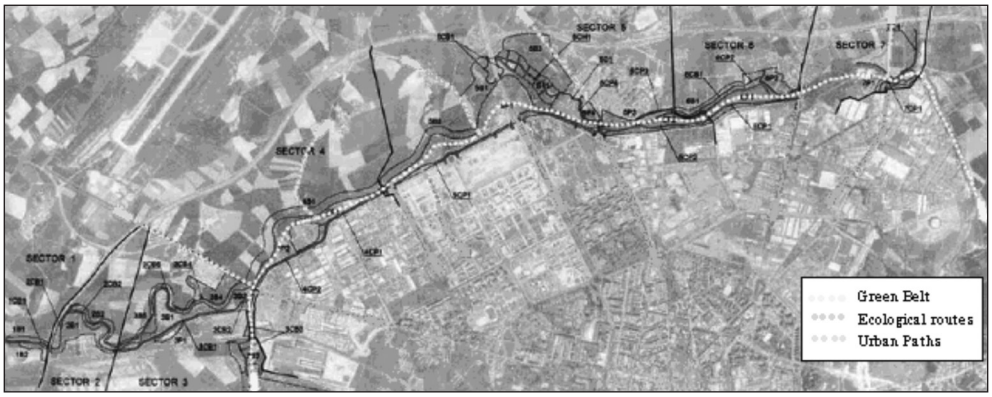
Source: Retrieved from Google Earth.

The solution adopted to offset problems created by the flooding of the Zadorra River (recovering the areas of alluviums and the reforestation of the banks) is also worthy of mention. After the construction of the Ullibarri Gamboa and Urrunaga Reservoirs in the mid-20th century, the flooding diminished, but still continued to be a recurring phenomenon. A project to channel the river was drafted but finally rejected due to popular opposition. The new governmental posture assumed that treatment of this area should be more respectful with the environment and intervention be kept to a minimum, the point not being to prevent floods from occurring but to act against the negative impacts of these overflows in residential and industrial areas. Several steps were taken: the recovery of riverbank vegetation to curb the erosive process, optimisation of the hydraulic capacity of bridges and their surroundings, enhancement of the left bank of the river as a green area and its inclusion in the Greenbelt, the installation of three footbridges to improve the connectivity of both banks, the creation of ecological routes, the building and signposting of urban pathways connecting the urban grid and the Green Belt, and others (see Figure 3).

Efforts have been particularly focussed on the involvement of residents in the project and on the implementation of environmental education activities. The Environmental Studies Centre, for instance, organised a wide-ranging programme of periodical workshops, training and educational activities targeting different groups (students, the retired, sufferers of Alzheimer's disease, autism and other developmental disorders...). Of all these activities, the ecological gardening workshop is achieving great acceptance and also provides opportunities to those who have been trained to cultivate the ecological gardens located in Olarizu Park. Meanwhile, the recently inaugurated Ataria Centre in Salburua, a Nature Interpretation Centre, with its emblematic architecture and a cantilever of wood and steel that soars over the water and spans 21 metres, is proving especially successful.

This educational aim is reinforced with the publishing of leaflets and scientific publications. There is also a library, located in the Casa de la Dehesa in Olarizu Park, containing more than 7000 documents (books, audiovisuals, manuscripts, etc.) on

Figure 3
AREAS OF INTERVENTION ALONG THE ZADORRA RIVER



Source: Hydraulic and Environmental Restoration Plan for the River Zadorra as it passes through Vitoria-Gasteiz. Vitoria-Gasteiz City Council.

environmental issues and associated subjects, relating to different geographical areas but including, in particular, all documents relating to the Green Belt and the municipality of Vitoria-Gasteiz.

Another outstanding aspect is that eco-efficiency and a maintenance economy have been favoured in the design of the parks, fostering infrastructures and facilities that are of easy upkeep and assuring not only economic savings but also clear ecological advantages. So, the parks do not rely on artificial lightning, the materials used in equipment and furniture (basically, steel, stones and wood) are easy to maintain, the vegetation planted is made up of native species and requires little care, and the rubbish collection and information points, car parks and fountains are located exclusively near the entrances.

A major effort to combat invasive species is also being undertaken to protect biodiversity. The red crab, exotic fish species, the American mink and the fern Azolla filiculoides are the most characteristic examples of invasive species within the area. Annual campaigns are underway to remove these species from the Green Belt.

To stimulate the tourist promotion of the Salburua Wetlands, the City Council has signed an agreement with Basquetour (the tourist agency created by the Basque Government) for the inclusion of Salburua in the Birding Euskadi network. Several routes surrounding and connecting the main lakes are publicised, two bird observatories are open to visitors and the Ataria Interpretation Centre plays an important role in visitor reception.

4.3. Assessment

The compact city has been suggested as a sustainable urban form for containing the impacts of urbanisation on remnant natural areas (Williams et al., 2001). Numerous studies have proposed a landscape mosaic made up of linear elements to increase the connection of otherwise isolated and often small green areas (Schrijnen, 2000; Flores et al., 1998).

Engulfing and fragmenting natural areas, especially in the peri-urban countryside, are to be minimised (Swenson and Franklin, 2000). Plans are being considered to use the Vitoria-Gasteiz Green Belt as an interconnector of all green areas and for it to serve as an ecological corridor leading to the Vitorian Mountains, but it must be pointed out that over the last years the city has been under pressure to urbanise to the south, thereby putting some valuable land in danger.

Several challenges must be faced in the coming years, amongst which the following should be highlighted:

- Limits should be put on the outward spread of the city and the «leapfrogging effect» (new developments outside the Green Belt), increasing densities in the new neighbourhoods whose planning proposals were presented following medium to low density specifications. In this regard, the revisions of the Plans for the Salburua and Zabalgana neighbourhoods (the two new growth areas for the city), though not welcomed by residents, can be considered positive.
- A legal framework protecting the Green Belt needs to be established (Bárcenas, 2001). In other examples of Green Belts such as those in Ontario, Tokyo or London, legal instruments have been approved that embody and protect these areas; in Vitoria-Gasteiz, on the contrary, no specific plan exists and it would be recommendable to develop one with specific norms for this area, regulating conservation and maintenance, expansion phases, and allowed and excluded uses, amongst other items.
- It is also important that more programmes and activities for locals (leisure, environmental education, sports, etc.) be developed. The public must realise that these spaces are functional and useful, and not simply land reserves. It would therefore be positive to enhance and give more publicity to the activities implemented, although currently the supply *is* already quite attractive (workshops, tours, birdwatching activities, photography exhibitions, organic vegetable gardens...).
- Certain areas of high environmental value have been recovered increasing the biodiversity of the flora and fauna. Each year sees a growing variety of birds nesting in the area and, thanks to the efforts of environmental technicians, many other species are re-colonising the area. This variety of fauna and flora can be seen as a strength and will act as a pull to attract nature tourism, which is becoming increasingly popular.
- Infrastructure and facilities within the Green Belt should be restrained. Very positive policies have been implemented endowing the area with equipment at a low maintenance cost and produced with environmentally friendly materials. However, the actions undertaken in Armentia Park and the subsequent urbanisation there have caused intensely negative impacts. Furthermore, the possible future installation of a wind farm in the Vitoria Mountains might seriously affect the biodiversity of the whole area.

Monitoring and evaluation processes should be established to allow feedback and continuous learning from this practice. It is true that the city has invested several years in the development of sustainability indicators within the framework of Local Agenda 21, while research projects in biodiversity are being conducted via the Centre of Environmental Studies (CEA), but more comprehensive work on social and economic information is needed. No studies have been carried out examining public usage of the space, there have been no

opinion polls to detect user satisfaction, and no economic assessments have been made of the impacts that this project might generate.

V. CONCLUSIONS

It is clear that this project has brought numerous advantages to the city, one of them being the public use of a wide natural area for leisure and environmental education activities. The city's urban planning legislation is not running in harmony with the project because there is no legal framework that includes the planning and protection of it. A disparity of rhythms and mismatch in both planning and administrative procedures can be appreciated, due to slowness in the planning system, the partial approach to urban planning and design and a lack of appropriate information sharing systems. One weakness is that the goals pursued by the project are not legally binding and have only advisory functions. There is no eloquent proof of the determination of this municipality to advance towards a sustainable model of a city fully integrated in the surrounding natural milieu.

But there is space for optimism, because previous studies for the development of the new General Urban Plan considered it necessary to enhance the role of the Green Belt as an intermediate space between the city and the natural milieu, ensuring a specific treatment of the area and giving it a tool of management, preserving in the meantime suburban areas which are still free of urbanisation. This is the first time that the local government has considered the need for planning instruments of this kind for the area.

The outstanding results obtained after almost two decades of work show not only the technical and economic viability of the project but also the social benefits, as an increasing number of the city inhabitants are taking part in the activities developed, while local use is also growing. But perhaps the problems that this kind of area must face, and this phenomenon is much more widespread than in rural areas, are those caused by humans. Usual examples of this include air pollution, water contamination, traffic noise, predation from domestic animals and disturbance from visitors (Botkin and Beveridge, 1997). In Vitoria-Gasteiz, intensive uses unquestionably produce the most problematic stress, especially those associated with motor vehicle traffic, vandalism and environmentally unfriendly recreational uses.

On the other side of the balance, however, one of the strengths we perceive is the active promotion of citizen participation, which is one of the best ways of guaranteeing the preservation of these green spaces. Another highlight of the project is the policy of keeping maintenance costs to the minimum through the introduction of native vegetation. Indicators must be established and linked with the goals of a multidimensional conception of sustainability. Whilst diverse studies are being carried out regarding wildlife in this area, there is no research into the economic impacts of the Green Belt and the social analyses that do exist are scarce and limited to assessment of participation in certain activities. More investment must be made into multidisciplinary research, as the studies developed are exclusively centred on ecological aspects while other social or economic issues are disregarded.

In order to conserve these enclaves they had to be interconnected one with the other as well as with the Vitoria Mountains and other territories of the greatest ecological value on the periphery of the municipality such as the Arrato and Badaia Mountain Range through ecologically functional corridors. One of the emblematic projects on which the provincial

government is working at the moment, in fact, is the construction of a second Green Belt further away from Vitoria that includes natural sites of high ecological wealth, expanding the Green Belt concept to a larger region.

To foster connectivity and avoid fragmentation processes and the consequent problems for the conservation of species that changes in land use can lead to, the articulation of linear landscape elements play a fundamental role (Benett, 2004; Velasco et al., 1995). The European Habitats Directive (1992) itself established as a requirement the conservation of connectivity and the ecological integrity of natural areas belonging to the Natura 2000 Network. In Vitoria-Gasteiz, some actions have been undertaken in this direction, but most of them pay attention only to the creation of forest corridors, with no in-depth consideration of the possibility of river and watercourse systems acting as connector elements (González, 2003; Gurrutxaga, 2004; Sáenz de Buruaga, 2005).

It is also important to articulate the Green Belt with the rest of the existing green areas inside the city. The Green Belt can, however, in itself serve to compensate for the lack of green areas in the new city neighbourhoods, obviating the creation of such spaces at direct neighbourhood level. We have to reconsider our approach, in that it is maybe better to bring the Green Belt closer to the city dwellers by means of better access, than to assemble new parks inside the city, bearing in mind that these urban parks have a high maintenance cost (planting, irrigation, pruning, grass cutting, etc.) and are frequently underused. In order to foster such accessibility, the configuration of a dense network of bicycle lanes connecting with all parts of the city must be outlined. The first steps have been taken in this direction but a lot of hard work still has to be done. Finally, we do not have to reject the notion that the Green Belt of Vitoria-Gasteiz might serve to prevent uncontrolled growth through the imposition of a no-growth boundary around the city. Here, practices to encourage the re-densification of the new neighbourhoods may be considered appropriate.

REFERENCES

AHERN, J. (1995): «Greenways as a planning strategy. Greenways: the beginning of an international movement» en *Greenways: The beginning of an international movement* (Fabos, J. y Ahern, J., eds.). Amsterdam, Elsevier, 131-155.

ANDRÉS ORIVE, L. (2009): «Paisajes de relación ciudad-naturaleza. Ensayo de modelos de planificación territorial más sostenible en Vitoria-Gasteiz» en *Ciudades más verdes. II Foro Urbano de paisaje de Vitoria-Gasteiz* (Centro de Estudios Ambientales, ed.). Vitoria-Gasteiz, Ayuntamiento de Vitoria-Gasteiz.

BÁRCENAS, J. (2001): «Problems with urban planning in the Vitoria-Gasteiz Green Belt», en *Les espaces naturels périurbains dans les politiques urbaines et métropolitaines* (Fedenatur, ed.). Barcelona, 26-27 de octubre de 2001. Retrieved from: http://www.fedenatur.org/docs/docs/115.pdf [Accesed on: 10 de noviembre de 2010].

BEATLEY, T. and MANNING, K. (1998): *The ecology of place: Planning for environment, economy and community*. Washington, DC, Island Press.

BENGSTON, D.N. (2005). «An analysis of the public discourse about urban sprawl in United States: monitoring concern about a major threat to forests». *Forest Policy and Economics,* vol. 7, nº 5, 745-756.

BENGSTON, D.N. and YOUN, Y.C. (2006). «Urban containment policies and the protection of natural areas: the case of Seoul's greenbelt». *Ecology and Society*, vol. 11, nº 1, art. 3. Disponible en: http://www.ecologyandsociety.org/vol11/iss1/art3/

BENNET, A.F. (2004): «Enlazando el paisaje: el papel de los corredores y la conectividad en la conservación de la vida silvestre». *Programa de conservación de Bosques UICN. Conservando los Ecosistemas Boscosos. Serie nº 1*. San José (Costa Rica), UICN Unión Mundial para la Naturaleza. Retrieved from: http://data.iucn.org/dbtw-wpd/edocs/FR-021-Es.pdf [Accesed on: 18 de abril de 2011].

BOTKIN, D.B. and BEVERIDGE, C.E. (1997): «Cities as Environments». *Urban Ecosystems*, vol. 1, nº 1, 3-20.

BROWN, D.G., PAGE, S.E., RIOLO, R. and RAND, W. (2004): «Agent-based and analytical modelling to evaluate the effectiveness of greenbelts». *Environmental Modelling & Software*, vol. 19, nº 12, 1097-1109.

CEA: http://www.vitoria-gasteiz.org/w24/es/html/

DE JUANA, F. (2003). «The Green Ring in Vitoria-Gasteiz: A Proposal for the Harmonious Integration of the City with the Territory», en *III Symposium International: The system of open spaces in the articulation of metropolitan areas* (Fedenatur, ed.). Barcelona, 26-28 de marzo de 2003. Retrieved from: http://www.fedenatur.org/docs/docs/242.pdf [Accesed on: 10 de noviembre de 2010].

EUROPEAN COMMISION (1992). *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora*. Retrieved from: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:NOT [Accesed on: 18 de abril de 2011].

FLORES, A., PICKETT, S.T.A., ZIPPERER, W.C., POUYAT, R.V. and PIRANI, R. (1998): «Adopting a modern ecological view of the metropolitan landscape: the case of a greenspace system for the New York City region». *Landscape and Urban Planning*, vol. 39, nº 4, 295-308.

GONZÁLEZ, I. (2003): *Análisis de los posibles corredores ecológicos entre los humedales de Salburua y los Montes de Vitoria (municipio de Vitoria-Gasteiz)*. Vitoria-Gasteiz, Centro de Estudios Ambientales, CEA.

GURRUTXAGA, M. (2004): «Conectividad ecológica del territorio y conservación de la biodiversidad. Nuevas perspectivas en ecología del paisaje y ordenación territorial». *Documentos Técnicos 103*. Vitoria-Gasteiz, Departamento de Agricultura y Pesca del Gobierno Vasco. Retrieved from: http://www.nasdap.ejgv.euskadi.net/r50-public2/es/contenidos/informe_estudio/ informes_tecnicos/es_agripes/adjuntos/Informes%20tecnicos%20103.pdf [Accesed on: 18 de abril de 2011].

HALL, P.H., GRACEY, R., DREWETT, R. and THOMAS, R. (1973): *The Containment of Urban England*. London, Allen and Unwin.

HOWARD, E. (1898): *Tomorrow: A Peaceful Path to Realm Reform*. London, Swan Sonneschein & Co.

KAHN, F.I. and ABBASI, S.A. (2000): «Attenuation of gaseous pollutants by greenbelts». *Environmental Monitoring and Assessment*, vol. 64, nº 2, 457-475.

KUHN, M. (2003): Greenbelt and green heart: separating and integrating landscapes in European city regions. *Landscape and Urban Planning*, vol. 64, nº 1-2, 19-27.

LINDSEY, G. (2003): «Sustainability and Urban Greenways: Indicators in Indianapolis». *Journal of the American Planning Association*, vol. 69, nº 2, 165-180.

LOBO URRUTIA, L. (2006): «The Vitoria-Gasteiz Green Belt: actions for the conservation of biodiversity», en *Les enjeux de la biodiversité dans les espaces périurbains / The challenges of biodiversity in periurban spaces* (Fedenatur, ed.). Paris, 9 de junio de 2006. Retrieved from: http://www.fedenatur.org/docs/docs/297.pdf [Accesed on: 10 de noviembre de 2010].

MARAÑÓN, B. (2001): «El anillo verde de Vitoria-Gasteiz». *Informes de la Construcción*, vol. 53, nº 475, 73-86.

MILLS, E.S. (2002): «Government urban growth controls». *International Real Estate Review*, vol. 5, nº 1, 1-11.

MORTBERG, U. and WALLENTINUS, H. (2000): «Red-listed forest bird species in an urban environment and assessment of green space corridors». *Landscape and Urban Planning*, vol. 50, nº 4, 215-226.

PENDALL, R., MARTIN, J. and FULTON, W. (2002): *Holding the Line: Urban Containment in the United States*. Washington, D.C., Center on Urban and Metropolitan Policy, The Brookings Institution. Retrieved from: http://localgov.fsu.edu/readings_papers/Growth%20Manag/Pendall _Fulton_Urban_Containment.pdf

SÁENZ DE BURUAGA TOMILLO, M. (dir.) (2005): «Análisis de la conectividad ecológica de los humedales de Salburua (Vitoria-Gasteiz) con las áreas naturales colindantes». *Informe elaborado por Consultora de Recursos Naturales, S.L.*. Vitoria-Gasteiz, Centro de Estudios Ambientales. Retrieved from: http://www.vitoria-gasteiz.org/w24/docs/ceac/siam/estudios/05-09/conectsalb06c/ conectsalb06c1.pdf [Accesed on: 18 de abril de 2011].

SCHRIJNEN, P.M. (2000): «Infrastructure networks and red-green patterns in city regions». *Landscape and Urban Planning*, nº 48, nº 3-4, 191–204.

SWENSON, J.J. and FRANKLIN, J. (2000): «The effects of future urban development on habitat fragmentation in the Santa Monica Mountains». *Landscape Ecology*, vol. 15, pp. 713-730.

VELASCO, J.M.; YANES, M. y SUÁREZ, F. (1995): El efecto barrera en vertebrados. Medidas correctoras en las vías de comunicación. CEDEX, Ministerio de Obras Públicas y Transportes.

WILLIAMS, K., BURTON, E. and JENKS, M. (Eds.) (2001): *Achieving Sustainable Urban Form*, E & FN Spon: London and New York.

YANG, J. and JINXING, Z. (2007): «The failure and success of greenbelt program in Beijing». *Urban Forestry & Urban Greening*, vol. 6, nº 4, 287-296.

YOKOHARI, M., TAKEUCHI, K., WATANABE, T. and YOKOTA, S. (2000): «Beyond greenbelts and zoning: A new planning concept for the environment of Asian mega-cities». *Landscape and Urban Planning*, vol. 47, nº 3-4, 159-171.