III Simposi internacional sobre espais naturals
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El sistema d'espais lliures en
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Les systèmes d'espaces libres dans
la structuration des aires métropolitaines

III International symposium on metropolitan
and periurban natural and rural spaces
The system of open spaces in the
articulation of metropolitan areas

Barcelona
26 - 28 . 3 . 2003

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INITIATIVE COMMUNAUTAIRE INTERREG III B
PROGRAMME OPÉRATIONNEL MÉDITÉRANNÉE OCCIDENTALE • MEDOCC

Federación Europea de Espacios Naturales y Rurales Metropolitanos y Periurbanos
Consorci del Parc de Collserola
Diputació Barcelona xarxa de municipis
AMB Àrea Metropolitana de Barcelona
Fundació Territori i Paisatge CAIXA CATALUNYA

Edició i producció
Consorci del Parc de Collserola

Comitè d'edició
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Fundació Territori i Paisatge (Caixa de Catalunya)

Disseny i maquetació
TACADIS

Infografies mapes
FARRÉS Il·lustració editorial

Fotografia de la portada
Valls dels rius Ripoll i Besòs
(Imatge cedida per Barcelona Regional, S.A.)

Impressió
Prismàtic Arts Gràfiques, S.A.
D.L. B-28.550/2004

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english version

Ramón López Lozano
Executive Vice-President of the Collserola Park Consortium and President of Fedenatur

Good day to everyone and welcome to Barcelona. I have the honour of welcoming all those present and thanking you for attending this III Symposium, which serves as a follow-up to the II Symposium also held in Barcelona in October 1995, more than seven years ago.

Before entering into what for me is the essence of this gathering, I wanted to briefly review the history that has brought us here, and just as we did in 1995 when we opened the II Symposium, recall that the origin of these specific debates on the natural environment and the city date back to 1983, when the "Symposium on Large Parks in Metropolitan Areas" was held in Barcelona, convened by the administration of the metropolitan area. The debates held at that meeting enabled us to lay the groundwork for creating the Collserola Park in 1987, upon approval of a Special Urban Planning Law on Protection which complemented the General Metropolitan Plan. Today, the Collserola Park is a consolidated project and serves as an enormous green lung and leisure space in the Barcelona area.

The functioning of our park, as well as other periurban parks, revealed to us the difficulties in managing these protected spaces, which are characterised by great anthropogenic pressure and a complicated position within the territory, which make them so different from traditional nature parks. The lack of tradition and experience in novel territorial models, and evidence of the existence of multiple initiatives in many different cities in Europe and other continents encouraged us at the Collserola Park to promote the II Symposium, envisioned as a totally open framework for exchange which would encompass highly diverse experiences related to the conservation of natural systems, of leisure and tourist activities, of structuring the green belts, of biodiversity, of training and awareness-raising, of legislative instruments, and so forth.

One of the most significant consequences of the reflections made at that Symposium was realising the need to create a network of management entities on a European level in order to be able to consolidate management models and establish common strategies for territorial protection. This led to the founding of Fedenatur (European Federation of Metropolitan and Periurban Natural and Rural Areas), the entity that convened this gathering and that now includes eighteen management entities for natural and rural metropolitan spaces located in five different European Union countries.

The work undertaken over these years within the scope of Fedenatur, which includes parks with highly divergent physical, climatological, environmental and demographic features, yet with the common trait of being located within metropolitan areas and the concomitant phenomena arising therefrom, have proven the insufficiency of the models of territorial protection previously applied in ensuring the land's sustainability, and in guaranteeing its biodiversity and environmental quality and the associated functions and benefits, which in the end affect citizens' quality of life.

Policies of nature conservation and rural spaces are still primarily based on delimiting a territory which is endowed with a legally protected status in order to preserve its values. Despite this, however, the protected space may not be removed from the dynamics generated throughout the territory as a whole. Thus, the declaration and subsequent management of protected natural spaces, while remaining totally necessary, can be insufficient in ensuring the long-term preservation of ecologically viable systems. This is especially clear in the case of periurban natural and rural spaces.

One clear example is the territorial fragmentation resulting from the construction of large-scale motorways, trains, services and other types of infrastructure networks, which at the same time are necessary for ensuring the welfare of citizens. A further example is the model of urban sprawl, which generates a diffuse city model. In these cases, open space and its functionality are gradually diminished, and natural, forested and agricultural spaces are broken up and separated, thus preventing them from being physically and biologically connected and impeding them from functioning as a system.

This is why we must broaden the perspective and shift from a sector-by-sector policy of nature conservation to more global frameworks that take into account the design of the territory as a whole and our ways of acting within it.

For these reasons, by convening this gathering, Fedenatur has demonstrated its understanding that the time has come to include the concept of open spaces as a continuous system in considerations of the functioning of metropolitan areas, and that this system must constitute yet another factor on equal footing with the other continuous systems implemented years ago. This new approach must be a factor that contributes to ensuring the environmental quality and sustainability of metropolitan territories, as well as the well-being and quality of life of the people residing there.

Thus, the Symposium that has just got underway will present case studies of different cities and metropolitan regions from around the world which stand out for the development and management of their natural spaces. I am convinced that from all the experiences presented over the three days ahead we will find examples and ideas that we can extract and implement in our own models of planning and management. It is also our desire that the reflections made and conclusions drawn at this event reach the European Commission, in order to make a contribution that helps this new concept of territorial policy to permeate what is generated within the European Union.

On behalf of Fedenatur, I wish to express my appreciation for the co-operation by the Association of Municipalities (Mancomunitat de Municipis) in the Barcelona Metropolitan Area and the Barcelona Provincial Council (Diputació de Barcelona), both of which helped make this event a reality.

Manuel Royes i Vila
President of the Collserola Park Consortium and President of the Barcelona Provincial Council (Diputació de Barcelona)

Distinguished mayors, ladies and gentlemen,

On behalf of the Barcelona Provincial Council, I am pleased to welcome you to this symposium. As the president of a second-level local administrative body, I wish to un derline some of the issues on which we shall focus our attention during this gathering.

Working in the metropolitan territory in order to provide support to natural and rural systems involves bearing in mind yet another parallel and decisive factor in the development of our society, and specifically of our towns. I am referring to the fact that this territory must also absorb the multiple activities and functions that are vital for the proper functioning of the economy and the promotion of well-being.

Along these lines, I should point out that the municipal administrations are those that are closest to the citizens, and they are also the ones that are responsible for directly managing the territory. This sustainable development, to which I am referring, is a true challenge on which depend both the potential of an effective improvement in the quality of life of people, as well as their economic and job expectations.

From a strictly municipal standpoint, a situation may arise in which the development expectations are not in line with respect for the principles of maintaining a system of open spaces. This is why it is so imperative to view the territory from a supra-municipal perspective which takes into account the real needs and expectations of each town or city, while at the same time also managing to discern the needs of the network of urban and open spaces in each town.

It is clear that, taking into account sustainable development from a broad, integrated territorial standpoint, there is no room for initiatives that run in detriment to certain parts of the territory. No one should ever come out behind. This is why a certain degree of protection for a natural or rural space must have clear repercussions on the common good, without harming it in any way.

This requires co-ordinated action among diverse stake-holders and administrations. Among all of them, the benefits, limitations and mechanisms for compensating territorial interventions must be weighed. We must thus develop precise, effective models for territorial management and governability, and the local administrations must take on an active, key role in shaping these territorial models.

In the case of the province of Barcelona, we already have some experience working along these lines. The Network of Natural Parks of the Barcelona Provincial Council has developed a model for managing and planning open spaces that has enabled it to resolve the issue of co-operation among municipalities, and that at the same time contributes to preserving those spaces in harmony with their economic development and their public use.

To accomplish this, we have encouraged local co-operation through the model of a network, and we have achieved significant progress in improving the territory and developing a high quality of life for its inhabitants. Since we believe in networking, we have also participated in creating and promoting Fedenatur because we believe that the local and European perspectives must converge.

I believe that the reports and debates that will take place during the course of this symposium will enable us to evaluate both how these new instruments have allowed us to move forward and what the avenues of action that most urgently demand our attention are. I trust that the outcome of this gathering will serve as a positive stimulus for all those in attendance.

Thank you very much for your participation.

Dídac Pestaña Rodriguez
First Executive Vice-President of the Association of Municipalities (Mancomunitat de Municipis) in the Barcelona Metropolitan Area

On behalf of the Barcelona Metropolitan Area, I wish to welcome you and take the opportunity to express our satisfaction at hosting this gathering of cities in Barcelona, the Fedenatur Network (European Federation of Metropolitan and Periurban Natural and Rural Areas), and especially the III Symposium which shall focus closely on open spaces in metropolitan areas and their potential quality as structuring systems.

Nowadays, the concept of sustainability as applied to territorial planning and development in metropolitan areas constitutes a novelty and represents a strategic proposition and a key factor for creating attractive, competitive cities that ensure a high quality of life for their citizens.

One of the functions that has fallen upon the shoulders of the leaders of metropolitan municipalities in the years that have elapsed since the creation of the Barcelona Metropolitan Area, has indeed been organising and structuring the territory in order to neutralise the imbalances inherited from the past, and particularly improving the quality of these cities and the territories surrounding them.

To this end, one of the essential and especially key avenues of work has been the treatment of public space, especially the designation and creation of green areas – urban parks – in highly dense urban areas previously lacking them, as well as the creation of large metropolitan parks which have enabled citizens from many different municipalities to have green areas and nature at their disposal.

Obviously, in pursuing this line of work, we are especially interested in the open spaces falling in the interstices within the metropolitan area, which we also believe must enjoy a certain landscape and environmental quality.

Thus, the proposition of viewing open spaces as a system is highly intriguing and attractive, yet it should also be said that it is extremely complicated and difficult, since metropolitan areas are immersed in very strong territorial dynamics which have a long history and which frequently depend on geographic frameworks and much broader economic and territorial strategies.

As an example of this, between 1972 and 1996, the urban land area in the Barcelona Metropolitan Region, which has a total area of 3,200 km2, underwent an increase of more than 100%, thus generating in those 24 years more urban land than in the previous two thousand years.

Thus, being capable of implementing this new concept in the development of metropolitan areas and regions is a real challenge, with the end purpose of making cities' economic and social development, their quality and liveability and their competitiveness compatible with the preservation of the natural and agricultural spaces that still shape our landscape, so that they can function as a true system and serve, in turn, first to complement our main policy on open spaces which we are already carrying out, and secondly to ensure the territory's environmental sustainability.

It is clear that the contributions to be made at this Symposium will be very useful to us, since we will learn about and confirm how these challenges have been handled and how similar problems are being dealt with in other cities around the world, in a field that constitutes a key factor for the future so that we may enjoy attractive, liveable cities that are committed to the environment.

Folch, Ramon

Doctor in Biology, socio-ecologist, promoter of socio-environmental thought and sustanabilist, author of numerous essays and 26 books.He was a lecturer at the University of Barcelona, in charge of the environmental services of the Barcelona Provincial Council and the Autonomous Government of Catalonia and consultant at the UNESCO and the European Union, with actions in Europe, Africa and Latin America. He holds professorship in UNESCO-FLACAM for Sustainable Development and is director of the consultants ERF.

Strategies for territorial analysis and planning: the complexity of connectivity.

(Direct transcription of the oral communication)

This text explains some of the reasons which justify the need to design urban and peri-urban policies which lead to territorial management models that are more in accordance with the needs of a developed world, centred on the predominance of urban structures over other forms of occupation and territorial management.

In this context, we must consider, in the first place, an essential concept which is the *territorial origin*, that can be defined as "everything which pre-exists the human actions which have shaped this socio-environmental reality we call territory". It is advisable to evoke this as the basic origin –which has been transformed so many times that we have the impression that it has ceased to exist—onto which the activities are placed. These activities can in some way mask the existence of this previous structure. Nevertheless, and although it may not be apparent, the structure always continues to exist and conditions the development of these activities.

The transformation of the territorial origin by the effects of human actions, anthropogenic actions, is almost always translated into an increase in diversity. Just see what happens when we replace geomorphologic terms for land use on a map, it gains a much greater wealth of shades and functions.

All too often human action is identified with a process of impoverishment of the natural values or diversity, and this does not respond to the reality we ecologists study. Certain values may be lost, certain elements and this can unfortunately happen, but what cannot be claimed under any circumstances is that the transformation of the territorial origin means the systematic loss of diversity. It is the exact opposite. It contributes to increases in diversity, not always positive increases in terms of the respect for certain values, but in any case diversity, and therefore the complexity of the territorial reality, is always greater in strongly anthropised areas than in the pervious territorial origin. For example, if crops are grown in areas of a forest nature, the forests are diversified, human settlements are installed and forms of ruralisation are introduced , that is to say, stages of peri-urban transformation. In short, what is produced is a large increase in diversity.

The territory, by the effects of human activity, becomes something much more diverse, but it is always conditioned by this territorial origin , by this biospheric origin. The very climate, always present (although in a very subtle way); the geomorphology, the nature of the substrates, the water regime, as an integral part of the biospheric territorial origin, continue to condition the uses that we can make of this diversified territory.

In this way the landscapes we have agreed to call *anthropised* have been generated. And these landscapes can be perceived in a very different way; therefore the concept of perception is an interesting idea which should be retained. Albert Einstein said that the facts are the facts, but the reality is perception. And this is very important. Realities are perceptions. We could get lost in philosophic discussion but we can also state that reality is a subjective fact. Reality exists in our heads. There are objective facts and subjective perceptive realities.

In order to illustrate this, all we need for example is the image corresponding to a field of wheat in springtime totally covered with poppies (figure 1). For the people who do not live from agriculture, this is a lovely looking landscape; if we look a little closer, this field of wheat is an agricultural disaster. The same emotional vibration which a person who lives from the tertiary or industrial sector to this field of poppies becomes worry and nervousness for the farmer, because he knows that every poppy is one wheat sheaf less. Therefore, the concept of landscape is installed in this reality of subjective perceptions. And this incredibly complex configuration of reality is increasingly complicated: the biospheric origin, the anthropogenic transformations and the different ways of seeing and perceiving each one of them. And if we wish to try to understand and manage these systems effectively in a correct, creative, imaginative way, we must not forget this permanent need to change perspectives. It will always be true that the biospheric origin subsists; it will always be true that it has been greatly transformed, enormously diversified, and it will always be true that we see and perceive it in a different way. Therefore, probably, designing territorial management policies demands not just the identification of these phenomena, but also the

conciliation of the interests which are behind them.

In this sense , the concept of landscape has undergone a very great evolution. First, when we speak of natural landscapes, admirable landscapes, we always referred to the large untouched landscapes. Where are the large untouched landscapes today?: Almost nowhere. The possibility for a normal citizen of the world to find himself just once in his life in a virgin landscape is remote. In fact, when we normally speak of landscapes we are talking about something else, we refer to a mixture of phenomena, of components, in which the remains of the untouched origin are mixed with more or less happy humanisation which are more or less picturesque, including transformations of a hydrological nature, with the creation of reservoirs, the modification of river courses, even the introduction of landscape architecture structures (figure 2). Particularly in very humanised countries, like in the Mediterranean, all the landscape has constructive elements which are diffusely placed throughout its extension in the form of land retention banks, in the form of electrical installations, etc.

The landscape we really have to face is a set of mixed, complex, fascinating and tensely dialectic elements, but the landscape by antonomasia, in which the majority of humans carry out their activity, is the city. There is a great diversity of urban landscapes.. For example, San Francisco constitutes a great hyper-dense concentration, typical of verticalised cities, as we can see in the aerial picture (figure 3). On the other hand, the city of Barcelona itself, as we can see in this satellite photo (figure 4), responds to a very different strategy,

There are territorial structures which are very old, as is the case of Rome (figure 5), a lovely picture to the extent that it responds to a typical way of implantation and domination of a territory , the identification of a river, with all its advantages –availability of water , means of transportation--, the proximity of the sea, without being right next to it, because of the dangers this has meant secularly, and then a progressive radial layout which responds to the gradual growth of the city itself.

What is so nice about Rome's structure is that all the communication routes which stem from the centre of the city, and which are perfectly operative today, continue to retain the same name they had over two thousand years ago: there is still the Vía Apia and Vía Julia, which now are motorways, but which originally were the old Roman roads. Evoking this is important because by these roads, which extend from Rome, we reach the outskirts of Barcelona, where they become the Vía Augusta. The great Roman invention given to the world was the concept of the vertebration of the territory as a political option, as from this point the world was organised. On the other hand, we are now discussing specific ways of organising sectorial fragments of our respective fields of action, as the result of the idea which arose in Rome at a certain time two thousand years ago, that of converting the territory into a space which was the object of planning. We have been born in this culture and it seems to us to be the most logical thing in the world, but we must not forget that this way of understanding the territory and space is born at a very specific time, that is, basically and above all, in Rome. Of course other earlier cultures had dominated territorial areas , but they had not had their political objective of the structural organisation of this space. In my point of view, what we are now doing is giving continuity to the Roman idea of space, and, using the same logic, I would like the sense of law, which is also Roman, to impregnate all the activities and all the decisions which, two thousand years later, we Romanised peoples will take.

Urban forms adopt different configurations and systems for occupying the territory according to the places. The satellite picture of the conurbation of London (figure 6) shows a typical example of an urban structure based on a city without an excessively great density , which occupies an enormous amount of territory but which is leaving a large amount of interstitial spaces inside its form of occupation.

It is a possible way, but there are other very interesting phenomena like that which is produced by the apposition of perfectly different urban nuclei which are merged together, like for example the conurbation of the Rhine-Ruhr (Düssseldorf, Duisburg, Essen, Dortmund, Wuppertal, Solingen, Bochum, Bottrop, Oberhausen, Mülheim an der Ruhr, Berlinhausen, Zelberg, Rheinstadt, Hagen, Neuss...). And nevertheless the perception one has when driving there is that one is before a single city. This phenomenon requires very different government strategies which give rise to very different strategies of use and management of the peripheral free spaces because in this case here there are well differentiated municipal governments which are independent from each other which must agree on their actions. The same does not occur when the large urban nuclei are subject to a single municipal power.

It is necessary to fix the terminology a little, as there are no abstract concepts. The concepts are, at the end of the day, terminological concepts, and therefore, defining the concepts well is the only way to create a really useful system of communication.

Increasingly there are more people who understand the *urban space* as a dense, built-up structure that is, in turn, the result of the conjunction of residential space as such –what everybody understands as an urban space, which means housing, streets- but also a *tertiary or industrial space*, which means shops, offices, industrial, which increasingly exists.

A *para-urban space* is a space which has been built up to a certain extent, but in a lax way, a para-built-up area. This para-urban space would be made up of, on the one hand, the elements of a different space called the *peri-urban space*.

The peri-urban space, as its name indicates, is located around the city. They are the suburbs, the urban peripheries where we find large shopping centres, large sports facilities and an increasingly important network of roads which is

situated in this space.

All this, in turn, is different from what some of us have called the *ruri-urban space*, that is to say, rural-urban, and there are these structures overlapping within the agricultural space which, nevertheless, have a certain urban-industrial nature: greenhouses, water tanks for irrigation, water purification plants –which are usually located in the middle of the rural space--, waste dumps, quarries and mining installations , etc. All this set of elements, which taken separately do not have much significance, however, all together are extraordinarily important for the space, for the territory. All of this can be called the ruri-urban space , that is to say, a space which, while implanted in the rural environment, has urban characteristics.

This ruri-urban space, added to the peri-urban space, is a constitutive element of the para-urban space, which is still enriched – or impoverished, according to your view- by the existence of the *vor-urban space*, that is to say, these purely residual areas such as interstitial waste land, that is to say, abandoned fields which remain among the road system, among the motorway, rail and road junctions, the communications junctions, etc. All this set of spaces, which are more and more frequent, add up to many thousands of hectares in the large cities. All this set of spaces: the peri-urban, the ruri-urban and the vor-urban constitute a para-urban space.

The challenge facing us at this time has much to do with all of this, because we are trying to achieve that this urban space fits in with the territorial origin without causing such extensions to the para-urban space which will end up converting the territory into total and complete chaos. The phenomenon of the para-urban space is a modern one . Until half a century ago –as a maximum a century ago in some places--, this kind of space was unknown: cities had their boundaries and in some cases ended drastically and spectacularly with a city wall. We do not have to go far to see this, because Barcelona is a case in hand. Until 1867-1868, Barcelona was enclosed by a wall. From this moment onwards, the walls are knocked down and the city expands. But it is a long time since cities stopped ending with a clean cut, and, quite the contrary, they spread out over the territory. What worries us now is the spread of the para-urban space and this justifies the existence of all our wishes to a large extent.

We are also witnessing the appearance of a conflict between the intensification of action and the progressive consumption of space. What is happening in a large number of our cities is that either they occupy an immense space because of the spread of the peri-urban, vor-urban and ruri-uban space, in other words the para-urban space, or they are excessively compact. It is as if a written text were spread out over a page and we fill all the space in a lax way, or if we compact the writing together; if we continue compacting, there will be paper left over, but a lot of the text we write will be unintelligible.

One example of the spread of the city over the territory we can see in a aerial photo of the municipal area of Granollers, located in a peripheral area to the city of Barcelona. This municipality, which until recently was clearly agricultural and which currently is very tertiarised, can exemplify this phenomenon in the territory. If onto a simple relatively recent aerial picture from the year 2000 (figure 7), we superimpose all the urban space structures (tertiary, residential, industrial, etc.), we add road structures and, finally, we add all the things I referred to earlier as vor-urban, that is to say, this urban camouflage in the form of greenhouses, water tanks mineral extraction, etc. (figure 8), we have a very worrying form of occupation because we realise that an important part of the territory is being torn apart. In this case ,and going back to the example of the text on the paper , it can be read well, but it takes up a lot of space. These peri-urban realities are more and more frequent in Europe and our worry is to know how we fit in to this territorial strategy and what we should do with these free spaces, which are gaining a singular, enormous subjective perceptive value.

All of this demands that, at least in the so-called developed or industrialised countries, we need to ask a basic question: Is free space the objective or one of the objectives of the territorial policies or the residue of executing them? That is to say, is free space the result of a territorial project or is it what is left over after having carried out territorial projects ? This is the great option.

When one sees pictures of the periphery of a city with all the occupation typologies described , one may ask if free space exists. Yes, of course it does, we could count it but, what does it represent perceptively? Practically nothing.
On particularly conflictive roadways, do interstitial spaces account as free space? (figure 9). We cannot honestly say that this is free space, as vor-urban space could be considered precisely as the least free of spaces, however, any geographical information system, if it responds to the strict application of what is each squared metre, will count it as free a space.

Let´s look back on the history of the metropolitan region of Barcelona. We know that until the 14th century in this area there was , approximately, some 200 Ha occupied which were inhabited by some 70,000 people. We know that in the 19th century the 200 Ha had by then become approximately 3,100 Ha, with a population of 644,000 people. In 1957 they were 11,500 hectares occupied by 2,267,000 inhabitants. And in 1992 we reached 46,700 Ha with 4,264,000 inhabitants. This evolution shows the rate at which the peri-urban areas are really being occupied in the majority of Europe's cities.

So, in the metropolitan region of Barcelona (approximately 3,200 Km$^{2)}$, the unoccupied ground , that is to say "free space", is made up of 20% of protected spaces; 40% of forest spaces and 26% of rural and ruri-urban spaces, that is to say, 86%; while the most para-urban space , which is the occupied space is 14%. Nevertheless, the perception we have is of a much greater occupation, which is the effect of placing the occupations of the territory strategically.

As an example we could use the conference hall where we are holding this meeting , which is practically full. With half the people we could achieve practically the same effect by occupying every other seat. If all the seats were filled from the first rows up, we would only need half the hall. What is happening in the first case here is that we are leaving many seats free and yet, we are occupying all the hall.

Another important factor is that we refer suitably to the concept of territorial scale. The scale is not the size of things, but the character of the phenomena. The scale does not give the size, it gives the character. By increasing the size of things, they do not change scale, they only change in measurement. When we analyse territorial problems we must take this very simple, elemental phenomenon into serious consideration, as we often forget it . We change the measurement of things and think that we have changed the scale. If we are capable of moving in suitable scales then we are seeing the character of the phenomena we are analysing. If we do not change the scale suitably , we will be fooling ourselves.

The time scale on which biological phenomena act is one; however, if we destroy this geological substratum, in particular the ground which supports the biological phenomena, within 20 or 30 years there will be exactly the same: destruction. We are going to need a few thousands of years for recovery of this area to take place. These problems must be dealt with on different time scales, but the reality is transversal and moves between different time scales.

When we act, we must know which elements we are affecting, because if we are affecting something which moves according to a time scale of 20 or 30 years, our success or failure will have an expiry date of 20 or 30 years. However, if we are affecting elements which belong to another time scale, our success or failure will have 30,000 years, 40,000 years, 50,000 years of validity. Moving between the time scales is important.

The continuity of the landscape deserves special attention. To do this it is necessary to introduce the concept of the *ecotone*. An ecotone is a line, a band in which there is a drastic disruption of the forms of the environmental conditions, which generates an also drastic change in the forms of biological occupation of this place (figure 10). The case of the sea-land is one of the most obvious; in general lines, fish do not occupy the land space, and land animals do not go underwater. But ecotones are not necessarily so drastic.

There are ecotones of different natures and, above all, on these ecotones which form part of the territorial origin of the previous biophysical reality where the human activities take place which produce a great increase in the perceptive diversity. So, the contact of the limestone massif of the Garraf with the alluvial plane of the delta of the river Llobregat, near Barcelona (figure 11), is an ecotone which is not clear because many things have happened in it: communication routes and buildings have been constructed , minerals have been extracted by means of quarries and 30,000 territorial transformations have been carried out.

One thing is the ecotone (which may be more or less clear cut or blurred) and another is a territorial breakage. Territorial breakages are made by us. In very transformed areas, there are so many breakages in the continuity of the landscape and territory that we reach a moment when we lose sight of what the ecotones are, or, in other words, we confuse one thing with another. This aspect is very important , because one of the worries expressed by wide sectors is to do with the need to guarantee the existence of biological corridors, of connectors between spaces which have been fractured as a consequence of urban transformations. The important thing about connectors and biological corridors is that they guarantee the genetic flow. The fascination for us in seeing fauna moving should not mask the fundamental fact that the aim of the corridors is not for the animals to go sightseeing, but to guarantee the genetic flow. But in order for there to be connectors there must be ways of surmounting breakages. What cannot be avoided are the ecotones. We are witnessing a great ceremony of confusion when both things are confused and, for example, it is said, with the best of intentions, that the existence of corridors from point A to point B musty be guaranteed because the urban masses are growing in such a way that passages are being closed off. All these warnings are fine, but whether the openings from A to B are maintained or not, practically nothing will pass through because before the buildings were put up, there already was an ecotone. Therefore, the fact that organisms do not move from one area to another has nothing to do with that motorway or those buildings, but with the fact that there was already an ecotone, that is to say, the construction of a mass of buildings along the coastline is not responsible for the fact that there are no fish living in the fields. Anyway, we have the challenge to build and guarantee good free spaces, by means of selection and identification of which territorial breakages are overcome, but what we cannot avoid is that the pre-existing ecotones continue to be manifest, those which already existed in the previous territorial origin.

These examples can be explained by graphic means (figure 12). Imagine that on an ideal space (A) we make a simulation and we count the male and female of a particular species (12 of each). Supposing that for the population to be maintained stable and alive, in this specific case, we need 5 of each. As there are 12 of each obviously the continuity of this population is guaranteed, that is to say that the individuals can really mix and the genes cross with normality from one part of the territory to the other. But if there is a breakage in this territory (B), perhaps the size of the residual populations in the fragmented territories is not viable, so, with the same number of individuals and having lost little territory --because at the end of the day the space lost by this breakage does not have to be very big --, the species will have lost all the area, because the minimum which guaranteed its subsistence (genetic flow) was those 5 and 5. This is the problem we face. Despite having lost little territory, despite not having suppressed a single

individual , these breakages do not allow a viable population of this species to remain.

From here arises the idea of the corridors. We implant two corridors and suddenly. everything starts to work, but wait, not everything, 3 fragments (C_1) start to work, because they contain individuals which add up to 9 plus 8, which guarantees the hypothetical minimum viable. Nevertheless, the isolated fragment (C_2) is still unviable. This is the principle, this is the idea of the corridors. The importance of free spaces is key in these urban interstitial areas because if all we have left are fragments, although adding them together they seem very important in reality nothing works. And in order to resolve this problem many solutions are known from the most elemental and picturesque, like creating passages for the fauna to cross under the motorway etc., and which are correct, to the creation of true territorial structures.

Sometimes nature origin corridors are planned which are not suitable for the territories they have to link, or which have insufficient size. The result is that ecologically correct corridors are created, but of insufficient size, or the right size but ecologically badly conceived. Neither one nor the other will be efficient, so, despite their existence, they are not viable for the population for which they were designed. This is very important , because we can make the mistake –carried away by enthusiasm and worry about the disasters of breakages that generate lethal incommunications -- of building false corridors which solve nothing. Also, it is also useless to establish corridors through ecotones.

But the reality is even more complex, because what we represent as a uniform green area, the hypothetical organisms perceive as a mosaic of many subsystems. This means that if we design the connector correctly but connect it where it is not suitable for these organisms, the connector will not function either. Everything cannot be resolved just by laying a cable, because we are facing a problem of the mechanics of fluids and complex fluids at that. We have to guarantee that the characteristics of this cable --both for its section as well as its nature—are suitable to the ends we are really after. Therefore, we use free spaces in their important function as connectors or corridors, but we have to know exactly what we are referring to when we speak of connectors and what characteristics they will have to have in order to respond to our needs (what should happen: how many individuals, how, in what way).

Another different concept is *landscape continuity* . With landscape continuity, to begin with, we do not propose that there is transit along a connector, but we do expect that the form, that the general structure of the la ndscape, meets some scenographic demands, of use by humans. There are two different things. In the blurred ecotone which I mentioned earlier (Delta del Llobregat) (figure 10) town planning is being carried out which envisages the construcion of part of this area and, therefore, the destruction of part of this free space. The first town planning project occupied it all in a more or less complete way, but we are working intensely with the authors of the real estate development and have managed to modify it, so we have contributed to drawing up a proposal which respects a landscape continuity but which to begin with is not a biological connector, because this area in an ecotone and, whatever we may do, the fauna will not pass from the mountain to the delta plane, because it has not done so for the last thousands of years, and is not going to start doing it now.

On the other hand, there are systems of territorial continuity which really do cross the area, like for example the rivers, which should be maintained.

In order to free all this large amount of space, which was going to be occupied almost completely, we increase the density of the buildings. This is a paradox with what we have to count. Remember that just by compacting the letters a little, we save paper, but without compacting them excessively so that the text remains legible. In this specific case , we compact sufficiently so as to save an important part of this paper. Once we have achieved this approach, we also place the compacted letters in the least sensitive areas and we guarantee the complete free movement of the two water course in existence. So, what I can say is that as far as our professional responsibility is concerned I can assure that if something wants to cross from one side to the other, if it wants to use the space as a corridor, it can, because it will be the organisms that will use these penetration channels in a normal way, that is to say the organisms associated with the water courses, which already existed . We have created this free space, we have even increased the significance of a wet area by means of a by-pass, which is a wet area that has been recreated as a compensation for the many other wet areas lost in the area, and we guarantee the existence of these large forest masses . If someone says to me: “It would have been better not to do anything here”, I will tell them that that is possible, it is probable. But that was not the question. The question has to do with what the occupation process of this territory will inevitably do : in what way can an occupation be carried out that guarantees the maintenance of certain values? We can state that a very important part of this area is preserved and even many of its forest values have been increased, and by means of this design the landscape continuity and connectivity are also guaranteed (figure 13).

Returning to a certain extent to the subject of scale, I gave another example, in this case that of a fragmented area for which a territorial solution was being looked for. It is a junction of roads, a purification plant and some sports facilities. Normally, the professionals are given this aerial view or the plan corresponding to the picture (figure 14), and they are asked to work on this. And who is worried about territorial matters and continuity start to ask questions like how do you pass from one point to another.

But the aerial picture is only a part of the reality. Reality does not finish there. If we worry so much about a part, we lose sight of the whole. Therefore, the will to maintain a biological connector which links these forests we see in the picture with those which do not appear in it does

not reside in seeing what happens in the problem area a little spot we have to save --, but in analysing what happens in the whole. To do this, to see things in their entirety, we must apply the suitable scale (figure 15). In reality, what is really important is to guarantee that a margin is connected with the other (figure 16). If all our efforts are centred exclusively in seeing how we save this spot from the motorway or how we save a specific corner, we are losing the totality of the film. And this leads us to a problem –extremely interesting and extremely delicate – in accordance with which the professional responsible has to tell the public administration: "You have commissioned me to do one thing, but to solve that I have to solve another. Do not tell me to solve this, tell me how we should approach all this other ".
I think that, to a large extent, this is the objective of the symposium: to understand how all these things work and not to lose ourselves in the small specific details of each one of the actions.

All of which leads us to the need to generate a new territorial model which will intend to place a little order, being respectful with the realities of the origin, advancing in the imaginative definition of new forms, new modwls of occupation, like for example the case of connectors, good use of free spaces, without forgetting some basic and fundamental elements: the case of the approximative scales.

In conclusion, allow me to evoke Gramsci: "we oppose the pessimism of reason with the optimism of the will".

Novelli, Ivan

Since 1998 he has been the Chairman of RomaNatura and member of the Governing Board of the Italian Federation of Natural Parks and Reservations and Member of the Board of Fedenatur. Before this, he was the Vice-Director of environmental policy of the promoting company for holding the Winter Olympics 2006 in Turin and the Olympic Games 2004 in Rome. From 1990-96 he was the national coordinator of the "Atmosphere and Energy" campaign by Greenpeace and from 1985-89 he was the head of the Press Office of the Radical Parliamentary Group in the House of Deputies.

Planning and management of Parks in a big metropolis: Example of "Roma Natura"

The foundation of the System

The regional natural protected area system of the Roman territory began in 1997.
The regional founder law nº 29/97 brings to a close a long political and administrative process which originated in the 1980´s; five months later, the Municipality of Rome adopted the Security Plan, which had reshaped and enlarged the guardianship of the environmental system of the roman territory, according to the delimitation of protected areas already discussed by the Communal Council in 1994-95. The existence of pathways, incorporated into the ancient urban area centre, provides a peculiar characteristic that has been called the "Green wheel".
The wheel consists of the perimeter boundaries and the spokes are represented by the green areas within the urban space from North to South.
Moreover the concept of the wheel establishes an important symbolic reference to the natural process and, definitively, to the ideal of sustainable development, emphasizing the fact that development must not prevent renewal of the ecological order, and that the historic environmental heritage cycle can be kept in accordance with social and economic development.
The City Council, who have approved the planning, have assigned 87,000 hectares of green and agricultural land, which is 68% of the whole territory.

The green occupies 68% of a community with a surface area of 129,000 hectares

32% Urban Surface.
11% Roma Natura.
29% Others protected green.
28% Green

Rome has the biggest agricultural community in Europe (65,000 hectares) and it is also a place that is rich in terms of biodiversity, in spite of the frequent wild construction that has been characterised after the post-war.
In Rome there exist more than 1,200 different species of flora. What is also important from a qualitative point of view is the fact that 80% of these species are indigenous to Rome (in the cities of central Europe the average is 50%).
There is also a considerable amount of fauna: to date 144 different species of terrestrial vertebrates and over 5,000 species of insects have been catalogued.
In an area which has a strong human trace, there is still a degree of diversity which demonstrates that the Roman territory is still at a level which maintains a rich and diverse ecological community.
During the last decade a vast amount of knowledge has been gained from the historic and environmental heritage which resulted from the demographic expansion.
The need to protect the identity and the health of the Roman territory has produced a vast cultural and political movement which was set up to protect the environment and to renew the development program.
The assignment of a single park entity "Roma Natura", is one of the most important aspects of the regional law (29/27). The assignment to the administration of approximately 15,000 hectares of the natural protected area within the Roman territory has set the conditions for planning through a coordinated System of logic.
"Roma Natura", which is the regional entity that is in charge of the administration system for the natural protected area within the Roman Community, was established in the spring of 1998, and is responsible for the administration of the natural park whose territory depends entirely on the community.
It is about a "Green System" which is constituted by 14 natural areas (figure 1): The Nature Reserve of Marcigliana (4,696 hectares) (figure 2), The Natural Reserve of Valle dell´Aniene (620 hectares),The Natural Reserve of Decima Malafede (6,145 hectares) (figure 3), The Natural Reserve of Tenuta dei Massimi (774 hectares), The Natural Reserve

of Valle dei Casali (469 hectares), The Natural Reserve of Tenuta di Acquafreda (249 hectares), The Natural Reserve of Laurentino – Acqua Acetosa (152 hectares), The Natural Reserve of Monte Mario (204 hectares), The Natural Reserve of Insugherata (697 hectares), The Regional Park of Pineto (243 hectares), The Regional Park of Aguzzano (60 hectares) (figure 4), The Natural Monument of Mazzalupetto (180 hectares), The Marine Area protected by the Secche di Tor Paterno.
The Parks of "Roma Natura" are at the heart of the network of the capital's protected areas, which also includes the other parks whose boundaries are extended outside the limits of the municipal area: The Park of Veio, The Park of Appia Antica, The Presidential Estate of Castel Porziano The State Reserve of Litorale Romano .

The planning of the Park

The planning of the Park has been defined by the subdivision of the area, which has been classified into four different levels: The Integral reserve, The General reserve, The area of protection and The area of economic and social Promotion, it establishes, through specific projects, the actions deemed necessary for the revaluation of the park with respect to: The renewal of the landscape, the raising of business activities, including those that offer a service to the visitor; and to increase the enjoyment factor for visitors. Therefore planning is an essential instrument to guarantee the protection of the area according to its naturalistic value and to guarantee the development of economic activity.
To ensure that the administration of the territory is managed effectively, "Roma Natura" has assigned 5 scientific research areas: fauna and zoology; flora, vegetation and landscape ecology; geology; historic cultural heritage and; economic potential.
Other studies, which have been coordinated by university students, have been used to draft the fundamentals of these plans. The results of these studies were presented at the beginning of the year 2000, and they offered an essential reference for the drafting of these plans. "Roma Natura" wanted the participation of a large number of people and to cover as many topics as possible, so as to include a wide cross-section of requests and documents from within the territory and its population.
The drafting of these plans has involved the Roman Community, The Lazio Region, citizens of the towns and villages, the agricultural association and local landowners. Through public opinion in each specific area, numerous observations have been included into the drafting of these plans.
Planning is a way of guaranteeing the careful conservation of the natural heritage. With the consolidation of the areas of "Riserva Integrale", there has been the reinforcement of the protection of places of natural beauty like "The Macchia di Capocotta a Decima" – Malafede, the Sughereta della Pisana and the Somaini forest in the estate of Massimi, and the beautiful forest of the Insugherata. Through this planning, "Roma Natura" achieves an important objective: to plan the development of agroturistic activities within the city, at present almost non-existent, and which will create at least 20 agroturistic areas.
There is a big potential for businesses who wish to become involved in the agroturistic development of these parks. From an economic perspective, research at the reserves can confirm that on the one hand there is a possibility of bringing into the park the important tourist flow of people who flock every year to the city, and on the other hand to give testimony to the interests of the Roman inhabitants with the creation of services inside the protected area: Beginning with the creation of shopping centres which would sell organic products and products from the park, and to include leisure activities without damaging the environment. This is to satisfy the demands of the citizens, within their large cosmopolitan life, to have a better quality and more intelligent attitude towards consumerism, as well as a better approach towards their leisure time.

The new strategy/approach for territory management.

These large undeveloped territories, which are dotted around the heart of the city, were once inaccessible. Vast and often beautiful sections of the Roman landscape have survived the urban sprawl of the city, which is well known to have happened frenetically after the Second World War conflict.
But its destiny looked already assigned: The vast increase in real estate prices in Rome has added to the distribution of large areas of the Roman land for construction. It seemed that even this land was to be assigned to uncertain urbanization.
During the past decades, the owners of these estates managed them with the criteria of the so-called "waiting agriculture":agriculture of low investment and low rent relied generally on land owners who didn't even make minimum profits. Therefore, any kind of link with the city and their inhabitants was missing. Although millions of Romans travelled through the crowded streets which run adjacent to the natural reserves, few of them have had the opportunity to access these rugged areas that are often a little surrealistic, set behind palaces of great height.
Therefore it has been necessary since the outset that there was a need for important advertising campaigns to educate the Romans to the fact that their city contains "beautiful green lungs of the historic town", the wonderful reserve of vast agricultural and woodland areas which is mostly wild and for centuries has been kept very rich with flora and fauna.
All of the public territory has been located and opened to the public, there has been an agreement with the

owners of areas that belong to the park to make them accessible to the public, and also to rejoin these natural areas back into the “weave of the city”, which have been created since 1999 welcoming services into the reserve, entrusting the management to those who have participated in the defence of this project, because the community administration did not gain the tutelage. Since four years ago “Roma Natura”, along with the help of 200 people, offers free visits with a guide to all the parks every weekend.

Numerous pathways have been opened up so that thousands of Roman children and adults can discover the rich and once unknown “natural heritage” of their city. Five old farmhouses have been rebuilt and already opened, which are now being used to inform the visitors about the areas and to exhibit beautiful documents about Roman nature.

The amount of visitors that have visited the parks has been extraordinarily high (200,000 people). Of the numerous campaigns and initiatives that have taken place during these years, 25,000 people have participated in guided visits. These figures are even higher when added to those that visit without the use of a guide.

Thousands of the city’s school students participated in the environment program which was organised at the end of 1999. Since 2003 the service has become more articulated thanks to the “Roma Natura” group of educational factories which have opened six agricultural estates within the city for the schools.

“Roma Natura” has also obtained important funds from the environmental department’s local program of “Agenda 21” which is to preserve the conservation of the territory, its resources and its biodiversity through the promotion of a sustainable development activity. Whilst encouraging leisure activity, it has been important at the same time not to forget that the most important factor, from beginning to end, is avoiding negligence and protecting the park’s “Natural heritage”. This duty has been carried out efficiently thanks to close collaboration with the State fire brigade which has put an operative group in place inside the headquarters at Villa Mazzanti, where the park wardens are located close to the entity. Consistent investment has been made to combat the “summer fires” that caused serious damage to the city’s forest in the past.

This active vigilance by “Roma Natura” has given excellent results by decreasing damages by 90%. Thanks to surveillance, vandalism that had seriously damaged the fauna has been defeated.

Concerning the intervention of the environmental requalification, the construction in the park of a footpath under the “Dell′ Appia Autica” road is costing the city council 84 million euros. This has allowed the reconnection of an important area in the most beautiful, archaeological and naturalistic park in the world (figures 5 and 6).

Domènech, Martí

Architect specialised in Projects and Town Planning at the Higher Technical School of Architecture of Barcelona (1984), Diploma in «Managerial Function in Public Administrations» at ESADE (1997) and MA in Town Planning Management awarded by the Polytechnic university of Catalonia (1998). Since 2001, he has been the Coordinator of the Natural Spaces Area of the Barcelona Provincial Council.

Models for managing open spaces applied in the Barcelona metropolitan area

Introduction

The local administrative complex in the Barcelona metropolitan region – town halls, the Association of Municipalities (Mancomunitat de Municipis) in the Barcelona Metropolitan Area (BMA), and the Barcelona Provincial Council – have become a pioneering administration in terms of the planning and management of open spaces on both a metropolitan and a municipal scale.

As a result of the municipal commitment by the local administration to preserve the natural heritage, in 1972 the Barcelona Provincial Council initiated an effective policy of protecting natural spaces that has resulted in the Barcelona Provincial Council's current Network of Natural Parks. This is made up of twelve natural spaces of a supra-municipal scope that is jointly managed by the town halls and the Association of Municipalities in the BMA, either directly or via consortia.

The strategic importance of this network is foremost in terms of ensuring an appropriate territorial and environmental balance within the geographical scope of Barcelona. Overall, this network covers an area of 100,625 hectares, divided among 99 municipalities. This represents 22% of the territory where two-thirds of the population of Catalonia lives (figure 1).

Following a metamorphosis resulting from a painstaking process of building and restoration, the spaces making up this network have gradually taken on the function of a system that completes the cities' green belts, and they play an important intermediate role between the urban green spaces and the larger natural systems.

Among the objectives governing the criteria for designing and managing these zones is that of blurring the limits between the natural and urban systems through specific types of design and appropriate models of promotion and management.

The network of metropolitan public spaces is made up of 27 parks that occupy an area of more than 200 hectares, and 26 km of beaches that link the natural and coastal systems with the metropolitan cities.

Finally, it is worth highlighting the fact that this model of planning and managing the network of open spaces, which is promoted and financed exclusively by the local administration, determines in part the basic scheme of metropolitan land planning, thus ensuring its environmental quality.

The planning and management of open spaces. The case of the Barcelona provincial council

During the early period of the Barcelona Provincial Council's policies on the protection of natural spaces, between 1972 and the mid-1980s, the planning and management of each of the protected spaces took place in isolation.

Thus, planning and management viewed the area to be protected as isolated from the rest of the territory. The model established for each space consisted of a central nucleus with maximum protection and a surrounding "buffer" zone to protect it from "battering" from the outside. All the plans promoted before the 1990s followed this planning criteria, and protection of open spaces as a whole was carried out on a sectoral basis. In this early period, land planning and concern for the territory did not exist, given the fact that the municipalities' true interest was resolving the serious infrastructure and service deficiencies that had been inherited from the Franco period.
Despite the fact that in this early period the protection of natural spaces was focused on a sector-by-sector basis,

the Barcelona Provincial Council's objective for each of the protected spaces was to define a project for the territory based on recognising the existing natural and cultural values through a process of planning, which was viewed as an agreement between the different public and private stakeholders with shared responsibilities and interests.

This policy of the Barcelona Provincial Council on matters of protected spaces was carried out on the basis of the following criteria:

Participation: Through the instruments encouraging participation in park management, the town halls, other administrative bodies, economic and social stakeholders and the rest of civil society were jointly involved in the complexity of the processes of land use, thus making it possible to integrate the protected natural spaces into the territorial dynamics of the different municipalities.

Social and economic criteria: By carrying out promotional actions for the primary and tertiary sectors, improvements in public infrastructures, facilities and services were made, with improvements in the quality of life of the population living there and the use of the space by society at large.

Environmental criteria: With the development of follow-up plans for the ecological parameters, assistance by experts and the implementation of restoration and improvement projects on the physical and biological environment, it became possible to manage and improve the natural system.

Cultural criteria: The establishment of cultural programmes and others aiding the restoration of the natural heritage allowed the landscape to be transmitted and managed as a dynamic reality resulting from natural factors and the transforming actions of humans.

At the end of the 1980s in Catalonia, and more specifically in the Barcelona Provincial Council, there was a change of viewpoint in the strategy used for planning natural spaces. Three factors decisively influenced this change. The first was the consolidation and dissemination of several different disciplines linked to conservation – biogeography, conservation biology and landscape ecology - which propose acting on the land while viewing it as a system in which the features and flows that exist in nature are identified, as is the interaction that humans have with this system; the concept of an oasis of nature underwent a crisis in that all the elements of the land were now viewed as interrelated. The second factor was the international agreement from the Rio Summit in 1992 in favour of conserving biodiversity. Finally, the last factor was the 1994 Aalborg Charter, which proposes the construction of ecological networks of natural and agricultural spaces that interact among each other and limit urban sprawl as the best strategy for protecting land.

Thus, the system of natural spaces was viewed as a network that had to be constructed from the standpoint of understanding the territory's diversity and using criteria of preservation and improvement or enhancement. It thus had to be organised taking into account the spatial, ecological and functional values of the spaces that formed its backbone.

The system of open spaces must provide the basic pattern for land development, first by delimiting the urban areas and then by defining their structure by making their functional logic explicit: settlements, areas acting as territorial connectors between these, and finally those that act as bands separating urban areas.

The criteria for planning and managing the land must also necessarily be diverse. It is obvious, for example, that one cannot expect to have all the open land in the province of Barcelona, which accounts for 87% of its area, managed under the guise of a natural park. The idea is to establish criteria that, guided by the principles of sustainability, will ensure rational land development by defining which areas require maximum preservation and which are more compatible with the processes of human occupation, and in what way. From all this, new categories of land protection and/or management must be derived by the establishment of consortia, associations and so forth and also from a new conception of the contents of municipal urban planning. In a certain sense, it could be claimed that the current model for protecting open spaces, which is supported almost exclusively by the management of certain unique areas which are declared to be natural parks, is nothing more than the result of the failure of the planning policies for land protected from building, which had to be fully incorporated in the municipal urban planning that resulted from a territorial analysis, leaving the specific protection categories for the preservation of open land as a last resort.

Thus, from these new theories and postulates, the initial idea that treated the preservation of natural spaces on a sector-by-sector basis was gradually modified, in order to approach the policy of effective protection of natural spaces on the basis of defining and managing territorial networks of natural spaces. Introducing the logic of the ecological processes in the territory as a whole appears to be the best approach in order to protect it from a type of growth that could squander our natural heritage and as a consequence diminish the environmental quality of the non-renewable resource par excellence: the land.

The parameters of territorial planning in Catalonia.

Nowadays we cannot talk about the existence of a system of open spaces in either Catalonia as a whole or in the province of Barcelona in so far as we do not have an operational territorial planning system that identifies these spaces as a basic feature of its structure. Within this framework, it can be claimed that the Park Network of the Barcelona Provincial Council (figure 3) constitutes on a de facto basis a very significant part of this planning in the province of Barcelona, to some degree taking the place of this more global planning that is non-existent.

The General Land Plan of Catalonia, dating from 1994, has not brought with it a step forward in the understanding and management of the territory. This land plan has not been effective for determining key open spaces for urban planning, also taking into account the fact that these spaces are defined in the plan on a sector-by-sector basis – slopes, agricultural spaces, forests, and so forth – without specifying their role in terms of the logic of ecological processes. Thus, they are not considered a determining system for territorial organisation.

Hence, from the promulgation of the land law in 1956 until the current Urban Planning Law in Catalonia dating from the year 2002, our territorial planning was approached, in the absence of an operational territorial plan, from the standpoint of the development of built-up spaces and infrastructures. Built-up spaces have had a municipal urban planning that has been shown to be insufficient in terms of territorial planning. The open spaces – land protected from building – have no plan and have been considered as an afterthought as land set aside just waiting to be occupied by the growth of cities or new infrastructures.

Nor has the system of open spaces been defined by environmental legislation. Our legal framework of autonomous communities bases the types of protection for certain natural spaces on a consideration of their uniqueness, generating a type of catalogue. In this case, the protected spaces are not the result of a systematic analysis of the territory, nor are the designations of the types of protection closely enough related to the processes of land development.

In short, the system of open spaces which provides territorial development with the needed coherence has not been determined based on territorial planning, environmental planning or urban planning, and this is a serious deficiency, given that future revisions of municipal planning and new infrastructures must inevitably be approached based on criteria of sustainability that require a definition of the territorial model within which they are framed.

The natural park network. Open spaces in the province of Barcelona.

The background of the Park Network can be found in the “Barcelona Provincial Plan” dating from 1963, which established a catalogue of 13 parks. Despite this, it was not until 1972 that an effective protection policy was initiated. In that year, the Barcelona Provincial Council used the pioneering category provided for in our urban planning legislation, called the special plan for protecting the physical environment and landscape, in order to protect and manage the spaces based on a process of participation by the town halls and interested members of civil society.

With an overall goal of preserving the natural and landscape values of the natural, agricultural and forested spaces in equilibrium with the socio-economic development of the territory and its social use, the following parks were promoted via direct management by the Provincial Council:

Sant Llorenç del Munt and l’Obac Natural Park - 1972
Montseny Natural Park - 1977
Garraf Park - 1986
Castell de Montesquiu Park - 1986
Montnegre i el Corredor Park - 1989
Olèrdola Park - 1992

In the mid-1990s, given the analysis carried out by the Barcelona Provincial Council based on the new formulations of landscape ecology, already mentioned above, on environmental policy and the status of the planning already underway, as well as on the metropolitan territorial planning – the proliferation of diffuse land occupation, and based on its experience in specific actions in planning and managing natural spaces over the course of 20 years, the Council formulated a land proposal for the metropolitan area. This proposal, called the Green Ring, proposes a system of natural spaces based on the connectivity of forested areas, agricultural areas and natural spaces, and it led to both the creation of new parks and greater interconnection between these new parks and the pre-existing ones, with the goal of increasing the level of environmental and landscape quality in the territory as a whole.

As a result of this pioneering initiative, the Barcelona Provincial Council and various town halls established the consortia that today manage the following park.

Coastal Mountain Range Park (Parc de la Serralada Litoral) - 1992
Marine Mountain Range Park (Parc de la Serralada de

Marina) - 1997 (2002 Special Plan)
Foix Park - 1997 (2002 Special Plan)
Les Guilleries - Savassona Natural Space - 1998
Baix Llobregat Agricultural Park - 1998
Collserola Park - 1999 (2002 Special Plan)

In terms of the most telling figures, we should highlight the fact that the Park Network of the Barcelona Provincial Council is made up of 99 municipalities; it totals 100,625 hectares; and it manages protection for 11.63% of the area of the province and more specifically 21.93% of the area in the metropolitan region where 70% of the total population of Catalonia lives. As a result, it plays a determining role in the organisation and environmental quality of our territory.

As a summary of the previous sections, it can be said that the Barcelona Provincial Council currently has a network of twelve protected spaces (figure 4), which mainly include the spaces with the greatest natural and territorial interest within the Barcelona metropolitan area. Despite the fact that the criteria of connectivity of the parks has been part of the strategy contained in the latest protection plans established, as well as in the expansion of the already-existing plans, it is clear that a true network of spaces has yet to be consolidated, both from the standpoint of territorial continuity and from the functional standpoint of their planning and management.

Mainly based on the concept of the territory as a system, which was primarily formalised from the discipline of landscape ecology, the strategy of planning the protected spaces has gone beyond the networks – made up of nodes and connectors – to include the territory as a whole – patches, corridors and matrix – as a functional unit that must be subject to planning in order for their main conservation challenges to be met.

In the Mediterranean area, this holistic approach is even more necessary, if possible, given the fact that the Mediterranean landscape is made up of a mosaic of interspersed uses that lead to an extraordinarily diverse and complex territory. In this context, the open spaces form a vitally important matrix for maintaining the main ecological and territorial processes.

In summary, the protection of the Mediterranean mosaic, of both its natural and cultural values and of the functionality of the system as a whole, must go beyond merely preserving the open spaces from being incorporated into urbanising processes in the medium term. To accomplish this, it is necessary to be aware of the value of these spaces and provide them with an appropriate long-term ecological, social and economic plan as the only means of ensuring their conservation.

The future planning and management of the system of open spaces.

Given the arguments set forth above on the evolution of the criteria for protecting natural spaces, and from their current status in the province of Barcelona, one can deduce that the future system of open spaces must be based on the current Park Network while also providing the rest of the land protected from building with meaning within the territory (figure 5).

Despite this, it is not foreseeable that in the short and medium term the Catalan autonomous government, which holds this responsibility, will deliver a land plan resulting from a much-needed participatory process that is capable of directly affecting the urbanising processes. Given this lack of determination, the local governments, which do not have responsibilities in matters of land planning, must be given an assessment of the territorial framework that is useful to them, at least for viewing development in light of the rational use of land, thus ensuring the maximal coherence in terms of land use.

Given the current administrative framework, the Barcelona Provincial Council is the government body that is best equipped to provide this territorial assessment service to the different municipalities, first because its main mission is to provide support to the town halls, and secondly because, as explained above, its cumulative experience in planning and managing open spaces and developing effective policies for protecting and improving land protected from building – fire prevention, rural tourism and so forth – supply it with the needed global understanding of the territory and the resources required to carry out these policies.

Given this context, the Area of Natural Spaces of the Barcelona Provincial Council has developed SITXELL (Territorial Information System for the Network of Open Spaces - Sistema d'Informació Territorial de la Xarxa d'Espais Lliures), a project that emerged as a tool for categorising and evaluating land protected from building based on the analysis, diagnosis and systematisation of its ecological, landscape and socio-economic characteristics.

SITXELL is a cartographic and alphanumerical database aimed at studying and assessing the open spaces as a whole, with the purpose of providing them with structure and making explicit their meaning within the territory. The global assessment proposals that emerge in the end from the analyses must enable the Barcelona Provincial Council to develop planning and management policies aimed at fostering the primary values of the open spaces, as well as provide support to the town halls so that their urban and infrastructure developments are approached

based on rational land use.

This overview of the territory enables two sub-systems to be identified: that of open spaces, mainly forested and agricultural, and that of occupied spaces, urban areas and infrastructures. Each of these two sub-systems has its own nodes, connectors, flows and functional logic and dynamics. Points of friction appear where the two sub-systems cross, and this is where land policies must be fine-tuned in order to ensure that both sub-systems retain their functionality.

In terms of agricultural areas, it is clear that agriculture must be encouraged in those places where it constitutes a primary economic resource, ensuring management practices that respect the associated natural values in accordance with balanced land use. It is more difficult to find formulae that ensure the continuity of cultivation in areas with dubious profitability, but where farming plays a valuable role in terms of ecology and land use. Public policies must play an active role in promoting agricultural uses, mainly in mountainous areas where they constitute enclaves with a high biological value, and in flat lowland areas where they can help make urban sprawl more orderly while furnishing environmental and social benefits.

In the case of forest uses, the challenges are even greater, given the fact that a large part of the forests in the province of Barcelona have virtually no economic profitability, and the lack of any type of management leads to their abandonment and frequently to the appearance of processes of gradual, or even sudden, degradation, as is the case of forest fires. Within this framework, the forest fire prevention programmes carried out by the Barcelona Provincial Council constitute a basic feature of a territorial management that aids in preserving the land and enables more ambitious projects to thus be considered.

The recovery of burned areas or joint forest management by property owner associations are two of the initiatives that are promoted by the Barcelona Provincial Council and must continue to be fostered. Likewise, other existing sectoral policies, such as tourism, must also flourish in order to furnish the projects with land protected from development.

Finally, despite the fact that these future prospects for actions to be carried out by the Barcelona Provincial Council are based on the logic of open spaces, it is clear that furnishing the project with land protected from development necessarily involves strengthening the role of small municipalities as well. Thus, the Barcelona Provincial Council must also foster land competitiveness by promoting policies for improving transports and communications and providing and developing the basic infrastructures in each municipality. New actions aimed at economic development, housing, tourism and job creation must also be carried out so that the inhabitants of municipalities not favoured by metropolitan dynamics or tourism have the same opportunities for progress and quality of life as the rest of the population. Only by ensuring the sustainable development of these municipalities can we guarantee the survival of the quality of our territory's environment and landscape.

Farrero, Antoni

Forest Engineer at the Higher Technical School of Mountain Engineers of Madrid. Director of the Natural Park of Montseny (1984-1988), and Head of Planning (1989). In 1990 he joined the Collserola Park, as head of forest management and fire prevention. From 1992 to 1998 he held several posts in the private sector, first as Technical Director and later as Director General of the company AGROTECSA, S.A. Since 1998 he has been co-directing the post graduate course on Management of Green Areas at the Foundation of the Polytechnic University of Catalonia. Since 1999 he has held the post of Head of the promotion and Conservation Service of the Public Space of the union of Municipalities of the Metropolitan Area of Barcelona, in charge of the management and promotion of the network of parks and maintenance of the metropolitan beaches.

Management models applied in the Barcelona metropolitan area: the network of parks and beaches of the association of municipalities in the Barcelona metropolitan area

The association of municipalities in the Barcelona metropolitan area

The Association of Municipalities in the Barcelona metropolitan area (Mancomunitat de Municipis de l'Àrea Metropolitana de Barcelona - MMAMB) is made up of 31 municipalities that decided to form an association in order to carry out a series of functions that had been left uncovered ever since the dissolution of the Barcelona Metropolitan Corporation in 1987. It occupies an area of approximately 635 km2, of which 37.5 percent is built-up and the remainder is taken up by agriculture (12.8%), forested land (46.1%) and other uses (3.6%).

Within the scope of the Barcelona Metropolitan Area (BMA) (figure 1), open spaces have come to play a determining role in citizens' quality of life. In 1976, the approval of the General Metropolitan Plan ensured the planning and conservation of the large systems that characterise this land, which has made it possible to consolidate spaces such as the Collserola and Marina mountain ranges, the Garraf massif, the nature reserves in the Llobregat river delta and the Llobregat Agricultural Park.

The local metropolitan public administrations, co-ordinated initially by the Metropolitan Corporation and subsequently by the Association of Municipalities, has been the impetus behind a steadfast, committed policy of formulating and executing projects which are devoted to improving the environmental quality and public use of the green areas scattered throughout the area.

These public spaces, which began as a series of parks arising from the opportunities that emerged from planning, have gradually become consolidated in the form of a green network that has spread throughout the area in a quest for communication between the spaces that form it, as well as with the other urban and natural systems. Thus, our challenge has been, and is, to holistically manage 29 spaces with highly varied characteristics, divided among 20 municipalities in the Barcelona metropolitan area. These spaces, which occupy an area of more than 200 hectares, are supplemented by more than forty kilometres of metropolitan coast, of which about one-half is beaches (figure 2).

Likewise, the experience accumulated over more than 20 years by the MMAMB in the management of metropolitan parks, encompassing the entire cycle from planning and tendering projects to executing and subsequently maintaining them, has made it possible to define a model of quality which is recognised by the town halls and users.

The network of metropolitan parks and beaches

Ever since the arrival of the democratically-elected town halls at the beginning of the 1980s, the metropolitan administration has carried out a steadfast policy of recovering public spaces. These are mainly places that, after the metamorphosis resulting from a painstaking process of planning and restoration, have come to form a continuous network of parks that completes the green belt of the cities in an approachable, accessible way, and this network plays an important intermediate role between the small urban squares and gardens and the large natural systems (mountain ranges, river valleys and the Mediterranean coast). The parks (figure 3) and beaches are systems that are highly valuable not only for their aesthetic functions, but also, and even more importantly, for their social function and for their role in improving environmental quality.

The parks in the BMA are located in highly diverse

landscapes: at the foothills of the hilly ranges (figure 4, Park of Calamot, Gavà), on plains or in the river valleys, occupying former industrial spaces or even abandoned dumpsites. Some have been made using modern designs and others by restoring old historic gardens. They have almost always been recovered through grassroots efforts, which have found support in the policy of recovering public spaces in neighbourhoods that were quite in need of them. They are places, in short, that dignify their surroundings and constitute an important contribution to the open space and quality of landscape in an area that is seriously affected by the uncontrolled, chaotic urban sprawl that took place during the second half of the 20th century (figure 5, Park of the Solidaritat, Eplugues de Llobregat).

Depending on their origin and location, the network includes three different types of parks that can be categorised in the following way: those located within urban areas, those in forested areas, and historic gardens.

In its almost twenty-five years of existence, the growth of the network of parks has been considerable, as can be seen in the attached illustration.

The beaches, too, are public spaces with highly divergent characteristics, from beaches that are clearly urban, such as those of Barcelona (figure 6) or Badalona, to those with a physiognomy more characteristic of natural spaces, such as the beach in El Prat de Llobregat, which includes a Special Protection Area for birds.

The three management axes

Based on the experience gathered over the course of twenty years of planning, building and managing the network of metropolitan parks, a common strategy has emerged that has undergone a transformation from a series of individual, separate spaces to the quest for a holistic structure.

This goal is guided by the formulation of a common management strategy for all these spaces and by the establishment of links or nodes between them:

This strategy is based on a series of concepts that can be summarised as follows:

1. Optimising the quality of the spaces in accordance with the economic resources available.

As can be seen in the attached scheme, the conservation of the parks is organised on the basis of co-ordinated action in three specific areas, which have do to with:

Organising the maintenance work

Every four years, the maintenance work is awarded to specialised companies by public tender, and the jobs are organised on the basis of annual programmes in which the regular tasks to be carried out in terms of gardening, facilities, buildings and civil works are reflected. These programmes are flexible and bring with them a commitment to quality for the different features common to all the parks. These annual programmes are developed into more detailed plans that are approved on a monthly basis.

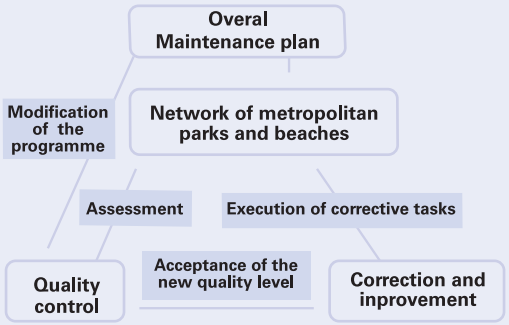
Controlling the quality of the maintenance work

This consists of identifying those key aspects in terms of the functionality and characterisation of the spaces (quality objectives). Periodic assessments of these objectives are made based on a ratings model. The quality control system is implemented through a certification process that varies depending on the ratings obtained.

Planning and executing tasks involving correction and improvement, as detected by quality control

The need for these tasks arises from vandalism, elements that become obsolete and other needs such as adaptations to regulations or the quest for better design solutions.

In each case, whether or not the increase in economic outlay brought about by this type of work is justified by the increase in quality is weighed up, and appropriate decisions are made as a result of this analysis.



2. Applying criteria of sustainability and quality that take advantage of the positive synergies with the rest of the land and maximally meet citizens' needs.

   This involves defining policies for these spaces that are aimed at designs in which the surrounding territory is interpreted and respected, and a policy of

sustainability is applied with the dual purpose of diminishing the demands on energy and water consumption and reducing and recycling the waste produced.

3. Becoming more user-friendly and carrying out awareness-raising activities.

   In order to make these spaces better known and stimulate the respectful use of them, the following lines of action are taken:

   Opinion and quantitative surveys of visitors who use the spaces on a regular basis. The results enable us to gather detailed information on the characteristics of the users, their behaviour and their perception of the space, as well as the degree of public satisfaction.

   Publications. There are two collections: the guides to metropolitan parks, initiated in 1995 (21 published to date), and the information sheets on unique trees and bushes, initiated in 2000 (18 published to date).

   Routes: These have been developed in conjunction with various organisations including the Barcelona Centre for Contemporary Culture, town halls, and different bodies and entities within the metropolitan area.

4. Improving the knowledge base through research projects and studies.

   These studies are oriented toward making better use of the resources and fine-tuning management techniques.

   Among the main projects carried out by the metropolitan area to this end in recent years, we shall mention just a few:

   A protocol for choosing ligneous species for low-maintenance Mediterranean gardening within the area of the metropolitan parks. This is a project financed by the Ministry of Science and Technology and carried out in conjunction with the Barcelona Botanical Institute (Institut Botànic de Barcelona), the Zaragoza Pyrenees Ecology Institute (Institut Pirenaic d'Ecologia) and the company 'Biorriza'.

   A study on the quality of groundwater in the Llobregat river near the Bellvitge Park in the town of L'Hospitalet de Llobregat, and its potential for being used to water the park's original vegetation. This study was carried out jointly with the Agricultural Research and Technology Institute (Institut de Recerca i Tecnologia Agràries – IRTA) and the Barcelona University School of Agriculture.

   Effects of soil compaction on the development of vegetation, a research project carried out within the area of the metropolitan parks in conjunction with the Barcelona University School of Agriculture.

The establishment of links or nodes among these spaces

Within the framework of the MMAMB Land Study Service, a system of Green Belts has been designed in which the metropolitan parks and beaches play a central role within a larger system, enabling a global model of use of the public spaces within the metropolitan area to be generated.

The Green Belts are structures envisaged for walking or bicycle riding and are free from vehicular traffic. They are made up of the following areas:

- The major forested parks: Collserola, Marina and Garraf
- The natural spaces in the Delta
- The metropolitan parks
- The beaches
- Major urban parks
- The Llobregat and Besòs rivers
- The connectors: pedestrian paths, coastal and riverside walkways, long-distance hiking paths, other paths and walkways free of vehicular traffic

As can be seen in the illustration, the green belts are made up of two rings: one inside and the other outside the city, as well as two connecting spokes. The design of these belts and their degree of execution can be seen in the figure 7:

Mallarach, Josep

He has been working on the planning and evaluation of protected natural spaces for the last 25 years. He was the director of the Natural Park of the Volcanic Area of La Garrotxa (1985-91), member of the management team of the Indiana Biodiversity Initiative Steering Committee (1994-97) and co-director of the Action Plan for Protected Natural Areas of Spain (2000). He is currently coordinating the evaluation of the effectiveness of the protected natural areas system of Catalonia.

Criteria and tools for planning and managing networks of natural and rural spaces in metropolitan areas: challenges and latest trends

Three physicists from Princeton University (USA), specialists in fractal processes, published an article in the journal Science, in which they compared the growth of three metropolises in western Europe to fractal growth and concluded that over the past five decades, the expansion of these metropolises had been basically governed by fractal processes, without the efforts by planners having altered their inexorable spatial laws. Personally, after more than twenty years working in urban planning, I believe that part of the pathological sprawl of large contemporary metropolises can most certainly be explained by fractal models, yet there remains a margin of freedom, of political and social will, if you will, of which we planners can take advantage. Were this not so, the proposals which I shall set forth below would be meaningless and impossible to truly accomplish.

From the standpoint of territory and the environment, the historical model of the city was characterised by compactness, complexity, diversity, efficiency and a relatively modest consumption of resources. In contrast, the model that has developed during the past few decades is characterised by dispersion, specialisation, spatial segregation, inefficiency and an exaggeratedly high consumption of resources. According to all evidence, it is a model of land occupation and social organisation that is much less sustainable than the previous model. The transformation of cities into sprawling metropolises through rapid processes of coalescence, reinforced by the effects of globalisation, has increased the environmental impact of contemporary metropolitan areas to the point at which, in order to not completely ruin their surroundings, they have had to develop complex strategies to import the resources they consume and export the impact they generate, the further away the better. Despite the major costs (social, environmental and economic) coming from the development and maintenance of these transport infrastructures, the processes of metropolitan expansion are characterised by causing a reduction in, and fragmentation of, the rural and forested spaces and landscapes which make up their territorial matrix, bringing with it an impoverishment in species, communities and habitats, and thus a gradual decrease in resilience and sustainability. This also, it should be said, leads to an inexorable sacrifice in the quality and beauty of periurban landscapes, as well as considerable effects on the health of the population, which tends to react whenever it can by periodically escaping from the degraded environment in which they live and work in order to enjoy more wholesome environs. This, in turn generates more infrastructures and services, the colonisation of new natural spaces, and to top it all off, further negative impact on the areas that are distant from where the spaces for citizen leisure are developed.

The initial reactions aimed at protecting the natural heritage around metropolitan environments, which were based on the protection of unique spaces through the establishment of parks and nature reserves, have been worthwhile – when they were effective – by preventing highly valuable emblematic features from being destroyed. However, over the years, these spaces have become isolated and incapable of serving as the backbone for sustainable land planning because we have not been capable of safeguarding their natural diversity, nor has the emotional need of the population that lives in increasingly artificial environments to have contact with nature been met in a lasting way.

In effect, despite the system of natural protected spaces that many European states have created, the losses in biodiversity within the European Union continue to mount year after year. One only has to read the reports by the European Environmental Agency (EEA, 1999) to understand the seriousness of the situation and the difficulty of facing up to all the underlying causes. In metropolitan areas particularly there are numerous direct, indirect and cumulative pressures and impacts that

concentrate and combine, interacting in complex ways that are hard to predict. The effects, however, can be seen by anyone. They include the annihilation of vulnerable spaces, fragmentation, the degradation and destruction of landscapes, the pollution of ecosystems and trophic networks, the disruption of essential ecological processes, vulnerable species getting run over or electrocuted, forest fires, soil erosion, and so forth. And as metropolitan landscapes are being ruined, more and more people are travelling for seasonal or weekend tourism, especially to the coast and the mountains.

From the field of land planning, one of the most coherent responses that has arisen in light of this complex situation in order to protect our natural heritage and meet the social needs of contact with nature has come via the establishment of functional ecological networks of natural spaces. The adjective "functional" should be highlighted in order to distinguish them from "networks of protected natural spaces", which are merely administrative or legal designations. The need to ensure ecological connectivity between the protected natural spaces has been a constant feature in international documents in the past few years, as can be seen in the Global Biodiversity Strategy (1992), the Action Plan on Protected Natural Spaces in Europe (1994), the Pan-European Strategy for the conservation of biological and landscape diversity (1995), the European Community Biodiversity Strategy (1998), and so forth.

A recent study by the World Conservation Union has inventoried approximately sixty regional or national ecological networks, and from them four features can be discerned: the majority of these networks are in the planning stages and receive government support; almost half of them have been initiated by non-governmental entities or research institutes; the majority of them include farmland, forested land or pastures; and their aim is to ensure territorial sustainability (Bennet and Wit, 2001).

It is worth the effort to briefly comment on several international and national experiences which show feasibility in different contexts. Let us begin with two examples from the USA, one of the first places this strategy was set forth. The system of environmental corridors in the south-eastern region of the state of Wisconsin, on the coast of Lake Michigan, was pioneering and is one of the most highly consolidated in the USA. Promoted by the regional planning commission in 1963, it is based on a multi-sectoral planning according to values (natural, cultural and social), aptitudes and risks, with noteworthy protection of prime agricultural lands. It was developed based on geographic information systems and has achieved a high degree of implementation and consolidation, with a remarkable series of inter-connected parks throughout the Milwaukee metropolitan area (Mallarach, 1994).

A quite different case is the ecological network found in the state of Florida, which was developed based on the Gap Analysis for Biodiversity, promoted by the prestigious NGO, The Nature Conservancy. It is based on ensuring habitat requirements for the greatest number of vertebrate species possible with the greatest territorial demands, and it has an exceptionally high quality scientific foundation. It places priority on the conservation and restoration of natural landscapes, including the costly redirection of waterways. It has the solid support of the state government and the public, fostered by the Florida Greenways Commission, and is currently in the process of being established, with an active policy of land acquisition.

In Europe, the obligatory reference point is the national network in the Netherlands, which served as the model for the European Ecological Network (EECONET), formally adopted in the Maastricht Treaty. This model, promoted by the Dutch government, is made up of a serious of protected natural spaces that form nuclei, which are then surrounded by buffer zones and linked by an interconnected network of biological corridors and complemented by a series of ecological restoration areas in order to ensure the functioning of the ecosystems (Bennet, 1991).

Some central European states have managed to take advantage of the transition from the socialist state system to the liberal democratic system in order to reserve public land ownership for the functional ecological networks that had been planned. Worth highlighting are the so-called territorial systems of ecological stability developed by the Czech Republic and Slovakia, conceived two decades ago when they were still a single country, and founded on ecological principles (Kubes, 1996).

In various Spanish autonomous communities, territorial plans or proposals for ecological networks which form part of the spaces within the European network, Natura 2000, have been promoted. One example of this can be found in the community of Madrid, which envisages using this means to permanently protect 40% of its territory. In Catalonia, we should highlight the Partial Territorial Plan for the Ebro Lands (2002) as it is the first to introduce this model by developing a directive within the 1995 General Territorial Plan of Catalonia, which establishes and regulates the category of ecological connector in extensive natural spaces (mainly mountainous areas, although also riverbeds in some cases) which physically connect the protected natural spaces included in the Plan on Spaces of Natural Interest (PEIN).

In the Barcelona metropolitan area, there is a series of environmental pressures and impacts that are among the most intense in Europe (European Environmental Agency,

1999). Some of its protected natural spaces, such as Collserola or the Montenegre - El Corredor mountain range, have virtually become biological islands. What is more, an important part of this biodiversity, such as avian species in danger of extinction, are found outside the protected natural spaces (Pino et al., 2000). This is why the development – or the restoration – of a network of functional ecological connections is so important there (Mallarach, 2000), and indeed in the past few years some very interesting methodologies have been developed to this end, proposed from the perspective of landscape ecology (Marull and Mallarach, 2003).

In many metropolitan areas, which already have a series of natural spaces under differing degrees of protection that are normally isolated from each other, the challenge that must be faced is that of conserving and restoring these spaces whenever possible by joining them into a functional ecological network. In the European Union, ecological connectors most likely encompass the majority of the habitats that currently have no form of protection, despite the fact that they are included in the Habitats and Birds Directives along with a representative sample of the agricultural lands that are strategically placed to avoid the coalescence of different processes of urban sprawl. However, it is necessary for the considerations of functional ecological networks to take care to optimise all the types of protection already existing in the rural environment, while at the same time including the limitations on the use of the land based on natural risks, such as proneness to flooding, geological instability, proneness to erosion or areas that are highly flammable.

In other words, sustainable land planning must take into account the territory's ecological network on varying scales as an articulated series of multi-purpose natural spaces which fulfil a range of mutually complementary objectives ranging from the effective conservation of ecosystems and their populations (especially the most vulnerable ones), the maintenance of the best agricultural lands, the functionality of the hydrological and geochemical cycles, ecological processes, the protection from natural and technological risks, and so forth, to the definition and construction of a park system envisioned to meet the multiple and increasing needs that citizens from sprawling metropolises have for contact with nature, through regional, county, and municipal riverside, marine, agricultural, forested and other types of parks, which thus defuse the pressure from tourism felt by natural spaces that have been protected due to their exceptional natural values.

In order to be able to maintain the functionality of the ecological networks in metropolitan areas with dense infrastructure networks, territorial and urban planning must seriously consider the objective of not allowing the connectivity of the urban systems to harm that of the natural systems. This obliges the entire communications and transport network, both new infrastructures and modifications to pre-existing ones, to be planned such that their ecological permeability is ensured. This in turn requires taking special care with new segregated infrastructures, especially motorways, roads and canals, which, depending on how they are planned, can lead to highly serious negative impact, and instead give priority to other modes of transport that are more sustainable, such as trains, tramways and bicycles.

On the other hand, planning instruments must give due consideration to the aesthetic and sensorial aspects of rural and periurban landscapes, which are almost always undervalued despite the fact that they form the physical framework for the quality of life for the majority of the metropolitan population. To this end, noteworthy projects include the map of aesthetic interest for the landscape in the Balearic Islands (Riera et al., 2001) and the protective measures for the landscape which it proposes, beginning with the views from the roads, residential areas and lookout points, since these are what determine the perception of the landscape quality for the majority of society.

Once the functional ecological networks are established, a periodic, honest and transparent operative evaluation of them must enable us to assess the degree to which they have met all their objectives and the effectiveness of the means used, in order to be accountable to society and promote the changes needed to adapt to new circumstances.

It is not out of line to recall here that we industrialised, materially wealthy countries have become experts in the business of importing raw materials and exporting waste and emissions. Thus, the fact that natural spaces near the metropolitan areas in wealthy countries are frequently protected at the expense of the destruction of magnificent ecosystems thousands of kilometres away, which the majority of people aren't even aware of, has been criticised. The ecological footprint and the ecological debt are two indicators that quantify the magnitude of this abuse, while at the same time they transmit values of equity and solidarity and help raise people's awareness. Alternatively, the precautionary principle requires measures to be adopted whenever there is sufficient evidence, and it obliges us to put a stop to this tendency toward inertia that causes so many serious problems in other parts of the world, beginning with climatic change. This means, as is logical, reconsidering from the standpoint of sustainability our models of energy and mobility, which are what support these unsustainable metropolitan models, and adopting the measures needed so that our society understands the consequences (both near and far-flung,

in terms of both space and time) of this wasteful lifestyle that we must all work to reform before it is too late.

To this end, there is an instrument that can supply a great deal of help: strategic environmental assessment, which is backed by extensive international experience (Partidário, 2002). Nowadays, this is one of the best tools at our disposal for accurately predicting the cumulative and synergistic impact that has almost always escaped the environmental impact assessments that have traditionally formed part of municipal urban planning schemes.

The European Union's Strategy for Sustainable Development (2001) requires current policies to be modified so that sustainable development becomes their central concern. The isolated inclusion of some sustainability objective in territorial or regional plans, such as the connectivity of natural spaces, is manifestly insufficient. If this inclusion does not involve transversally encompassing all the basic sectoral policies (urban planning, energy, mobility, etc.), the incoherence in the current metropolitan models will not be resolved, nor will more sustainable policies be promoted.

A type of territorial planning that truly includes the principles of sustainability, such as the functionality of the networks of natural and rural spaces, is a challenge that has certain risks and costs for the governments that choose to promote it, but both of these are incomparably less than the challenges and costs involved in continuing forward without territorial planning, or even worse, with obsolete territorial plans that limit themselves to consolidating or diminishing the current unsustainable trends. The proposals that R. T. Forman puts forth for the greater Barcelona metropolitan region clearly demonstrate this.

From a utilitarian standpoint, then, functional ecological networks must ensure the lasting nature of environmental services that generate a wide range of social benefits, both direct and indirect, a reason why they must slowly be incorporated into the tax systems as they gradually incorporate tools of environmental and ecological economy such as those proposed by Brown (2002). From the ethical and moral standpoint, these functional networks of natural and rural spaces are indispensable for conserving the intrinsic values of our natural heritage, which we have the duty to pass on to our descendants, better than they are now, if we can. Because all the wise people and religions from settled civilisations around the world converge on one point: we do not own nature, or life, or its resources, rather we are mere administrators or users. We must never lose sight of this unanimous consensus by humanity.

I shall close with a declaration that Oren Lyons, spokesman for the Iroquois Confederation, made at the UN headquarters in 1993. This confederation has the distinction of being governed by the oldest active democratic government in the world, with a constitution that has been in force for more than a millennium, thus making it an unquestionable reference point in sustainable governance. He said: "According to our constitution... only those decisions that are taken bearing in mind the good of the seventh generation are legitimate (...). We are the generation with the responsibility and the option to choose the path of life with a future for our children, or the path that challenges the laws of regeneration (...). If we take the lower path, our children will have to pay for our selfishness, greed and lack of vision".

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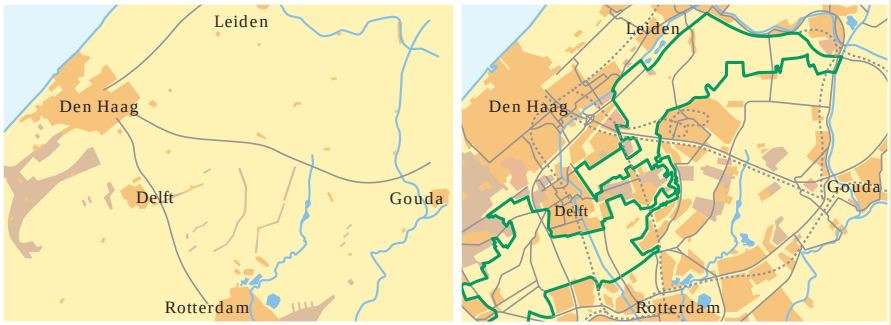
The Green-blue meander: Towards a blue-green lifeline running through South Holland's western urban area.

The Randstad is the area encompassed by the Netherlands' four largest cities: Amsterdam, Utrecht, The Hague and Rotterdam. This is also the most densely populated part of the country: an area covering less than 25% of the Netherlands is populated by 7 million people –almost half the Dutch population. The Randstad is slowly but surely becoming one big urban network of intertwined cities and villages: the Delta Metropolis. If this process does not proceed according to an effective plan, the balance between urban and rural areas could very well disapear (figure 1).

Having a vital, strong green-blue framework offering sufficient nature conservation areas and recreational facilities, however, will retain a good balance between the city and countryside, between urbanisation and the lush vegetation of rural areas.

The Green-blue meander covers more than 200 square Kilometres and winds through an S-shaped open area between the cities in the South Wing. The Green-blue meander will connect existing but currently fragmented bodies of water and green areas and thus unufy the lanscape. Redesigning and creating connections will lead to the developement of a vital ecological and recreational buffer that will be highly resistant to the future march of urbanisation. Within the South Wing, The Green-blue meander will become the most important binding structure: an ecological lifeline for its human inhabitants and for its flora and fauna. This ecological and recreational network is intended to make a substantial and sustainable contribution to the residential and living quality of its very economically important production area in the Netherlans.



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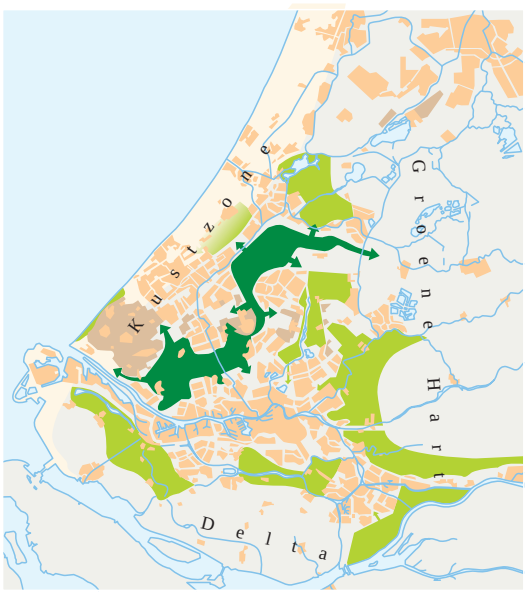
The Green-blue meander is a project, that aims at:

- a better quality for living and working
- making new nature and recreation zones
- city and countryside, working together not opposing each other
- simultanously economical impuls as well.

By preserving the good qualities of the countryside and improving the rest:

- enhancing ecological and reacreational zones;
- improving accessebility to the countryside;
- changing agricultural used areas into a more public territory.

2



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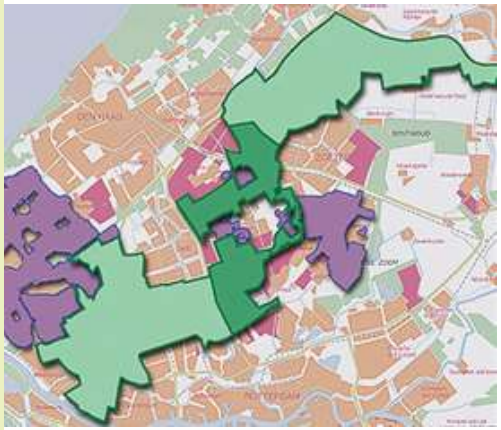
Two specific elements of the Green-blue meander are the ecological framework and urban development.

At a national level in the Netherlands the policy is to create new ecological areas and connections/or ecological corridors between them (figure 2) . This national policy has been adapted for the province of South-Holland (figure 3), the inplementation consisting of:

- New forests and woodlands;
- Preserving meadows and its typical habitats for birds;
- Preserving open water and wetlands;
- New recreation areas.

The urban development of this part of the Randstad has become one big network for 2,5 million inhabitants in the direct vicinity of the Green-blue meander (figure 4)
Under this pressure the concept of Green-blue meander was born to develop a vital framework, offering bufferzones for:

1. sufficient nature conservation
2. water conservation
3. new recreation facilities



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So, the Greenblue Meander covers more than 200 square kilometers (20.000 ha) in total. It should connect currently fragmented bodies of water and green areas into a network of green and blue. Redesigning must lead to a largely appreciated network as a highly resistant framework to urban developments. Existing loose parts will at this higher level much more resistant than as loose and the segmented parts itself.

Eleven strategies should be followed to implement this concept:

1) From fragmented green spaces to a robust continous network of open and non-urban spaces. From fragmentation towards a continious network of open and non-urban spaces;

2) From turning our backs to the countryside to appreciating its value. Developing the countryside for its own reasons and no longer for reasons as a reservation-area for ubanisation to come!;

3) From scenic green space to usually green also enjoyed for its scenic value by people living nearby. You should be able to use the countryside instead of only looking to it;

4) From encroaching urbanisation to planned urbanisation with a robust network of green spaces. No longer should a planning system be used that only hints on urban developments, but you should use a planning system which includes a green framework as part a total development; not opposing but improving urban and non-urban developments.

5) From fragmented nature conservation and recreational areas to continuity, enlargement, cohesion. Ecological connections or corridors must enhance the ecological systems as a whole. Ecological areas at an urban level and nature for people instead of nature for the sake of nature itself.

6) From inaccessible green space to good connections between city and countryside and between the green space. Attainability is an important factor in the appreciation of the countryside. You should be able te get there from the surrounding residential areas.

7) From an unbalanced system of water management to a durable watersystem and water management:

   a. Connecting water-systems;
   b. Retention of water in times of flood and drought;
   c. Sufficient water quality must create a sustainable watermanagement.

8) From fragmented amenities to an extension of recerational connections. Connecting the recreation-areas will enlarge the capacity of existing recreational areas without extra landuse and without huge investments.

9) From mono-functional agriculture to variation and diversity by means of specialised planning areas. Diversification of functions in the countryside leads to a more attractive public space. No longer interesting for monofunctional use only but multifunctional use and appealing to a lot of people.

10) From inaccessible green spaces to good connections between city and countryside and between the green space. An accesible countryside should involve new posibilities for the daily recreational needs.

11) From cultural history at a distance to experiencing it from close-by. Methods for experiencing and appreciation should make the Greenblue meander worthwile.

The goals:

1) The implementation of the strategies will lead to the transformation of agricultural used land for recreation and new nature (figure 5).
   this will lead to:
   - a matrix consisting of water and land;
   - and bufferzones between the urban areas.

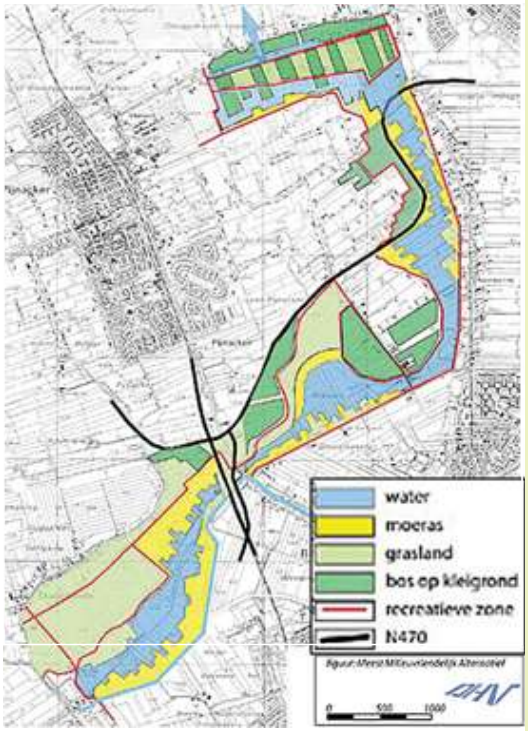
   It will also lead to direct urbanisation and to an attractive area.
2) The construction of 125 kilometers of ecological connections, such as canals.
   And the construction of recreational connections, such as crossings over motorway as bike-paths; for the area as a total, as well out from the residential areas (figure 6).
3) In times of a climatic change we need to develop a sustainable water system between city and countryside.
4) The identity of the Greenblue Meander should be using existing historical elements and values.
5) To transform the land towards a more friendly and co-existing use with urban areas (figure 6).

The strategies and goals are not implemented in the same way all over the Greenblue Meander. We distinct between a transformation and an alteration approach. Transformation leads to complete change of functions to ecological, recreational and watermanagement, needing for buying, developing and management on a large scale. Alteration zones will stay mainly agricultural with better attainebility and accessibility.

The masterplan of the Green zone (a transformation sub-area) has developed and is now under search for the effects on the environment. Also to find more money to be able to meet all goals that were get.

Realisation is a complex figure because of all the participations of 3 layers of governments ans 2 urban regions end 16 local governments. Also 4 waterboard which are responsible by law, for water quality and are semi-public bodies.

To easy the realisation and complexity we therefore have chosen to implement in 5 sub-areas.



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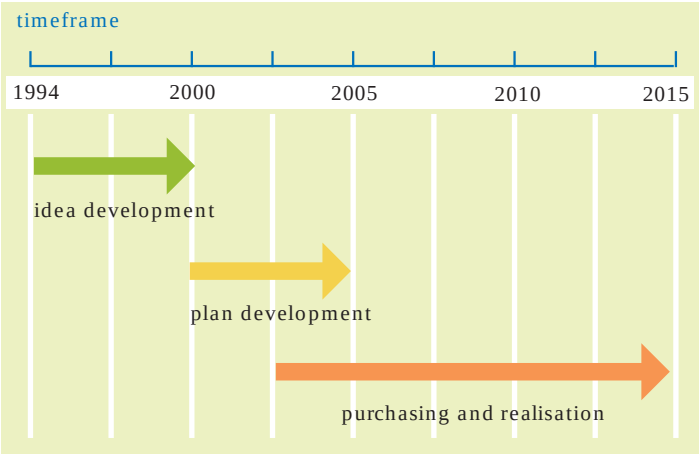

This will lead to an investment of 200 million euro's mainly for the transformation areas.
Mostly will be needed of the national government (80%) and furthermore regional/municipalities public parties (15%) and private parties (5%). Also the management-costs of th areas will have to be met by different partners, approxematly 1,500,000 euro each year (national government, 50%) . I am glad to say that investment and management needs are greatly met till now.

To mention the most important 4 success factors:

1) Shared responsibility based on mutual recognition of problems and solutions, not only from governments but also for nature reserve groups, new inhabitants etc.
2) Multiple land use enables early agreements on main targets like the combination of water catchment and use as recreation area or agricultural use.
3) A possibility that enables farmers to diversity new land use as rental boats or goats farming.
4) Finally it was very important to transform the project from a mono-functional ecological target towards a multifunctional target with acceptation of the urban needs of all its inhabitants.

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Emscher Landscape Park - a new regional park in the Ruhr area (Germany)

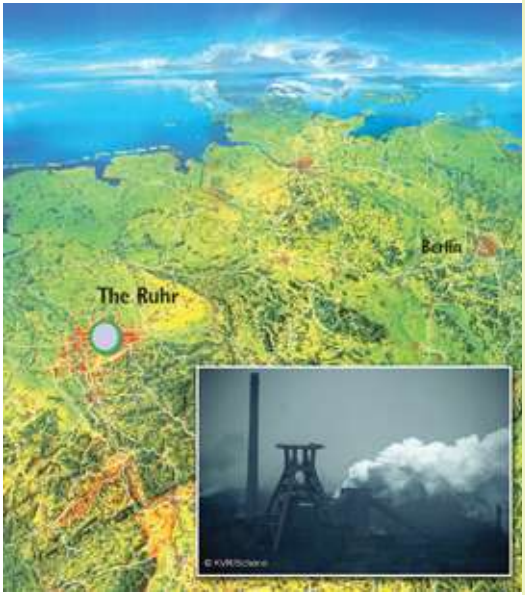
Introduction

The country between the Rivers Ruhr in the south and Lippe in the north and with the Emscher in the centre is originally neither a landscape – geographically nor a historically political unit.

The Ruhr was the industrial heart not only of Germany, but of all of Europe for more than 100 years. Industrialisation formed a whole area and influenced not only the urban area but specifically the development of the countryside. The result is a man-made, artificial surrounding (figure 1).

In the middle of the 20th century the industrial boom stopped. Industrial plants are no longer in use. A lot of people are unemployed. Since this time, we experienced a deep structural and social transformation in the Ruhr.

In 1898 the government of North Rhine Westfalia started the International Building Exhibition (IBA), to prepare a strategy for the ecological, economic and social development of the Emscher region (784 Km2). It was created for a term of ten years, to give an impulse for new ideas and projects. IBA was a forum to exchange ideas and experiences, for dialogue among all groups in society, for the detailed discussion of ideas and planning schemes.



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The Emscher Landscape Park project

Within the framework of the International Building Exhibition (1989 - 1999) the Emscher Landscape Park was the central component of an integrated development strategy for the former industrial region. It was intended to create a new Regional Park, the Emscher Landscape Park – with a length of 70 Kilometres and about 320 square kilometres of land running from west to east through the Emscher Region (figure 2).

The five objectives for the Emscher Landscape Park are:

- Preserving the remaining leftover landscape
- Linking up the isolated, separate areas in the agglomeration
- Re-zoning separate areas as parkland
- Reaching agreements both regionally and locally on individual projects with a long-term perspective and
- Maintaining and managing the new open spaces in a permanent regional park association.

The aim is to improve the working and living environment for more than 2 Million inhabitants in the region.

2

The civil - and district administrations together with KVR[1] (Association of Ruhr District Local Authorities) have been working on this massive exercise in landscape design within the framework of IBA since 1989. 17 Cities (Bergkamen, Bochum, Bottrop, Castrup-Rauxel, Dortmund, Duisburg, Essen, Gelsenkirchen, Gladbeck, Herne, Herten, Kamen, Lünen, Mülheim an der Ruhr, Oberhausen, Recklinghausen, Waltrop), 2 urban districts and KVR have formed 7 inter-municipal working groups to undertake the planning on the 7 green corridors running along a north-south axis. In each of the corridors there are anchored a lot of small projects but one great model project exemplifying the various themes adopted in the Emscher Landscape Park.
Together with a new east-west-corridor, called the new "Emscher-valley", this will constitute the basic framework of the future Emscher Park.

The idea of a regional park system has a long history in the Ruhr region. Robert Schmidt, who was later to found the regional housing association, Siedlungsverband Ruhrkohlenbezirk (SVR), was the first to formulate the vision of a "national park" for the industrial district of the Ruhr.
Taking up this earlier idea the individual north-south-corridors are being expanded and linked to a new east-west-corridor to form a complete park system of European Significance. The first decade of project development has finished. Until 2001 more than 300 Projects of different importance have been carried out. This is compatible to a plain of 3.300 football fields or 33 square kilometres.

During this first decade the IBA Company was the mediator of the Development, KVR was responsible for the master plan of the Emscher Landscape Park. After finishing the IBA, Project Ruhr (a new company to promote projects in the Ruhr area) took over the task of project management. They are working on the master plan 2010 together with all the other participants. The main point of the third decade will be the Regeneration of the Emscher River System together with the development of the new Emscher Valley.

3

The spectrum of landscape design in the Emscher Landscape Park is broad and its variety is important. The design canon for the Emscher Landscape Park was based on the deliberate incorporation of the industrial landscape, the aesthetics of industrial culture and the quality of nature in the industrial area. More than 150 years of industrialisation have left their mark on the region: mines, cooking plants and winding towers are impressive relicts of a former area. Today the buildings are architectural witnesses explaining the history of the region. It was also important to create atmosphere, an identity and a feeling of home for the city dwellers and their industrial landscape. Beyond it 580 km new cycle and walking paths were built, for example the Emscher Park cycle path with 230 km and the Emscher Park walking path with 130 km. (figure 3).

Finance

With it Emscher -Lippe Ecology Programme the Government of North-Rhine/ Westphalia has created the necessary financial base for implementation of landscape projects until 2006 (2008) The range of projects in the Emscher Landscape Park stretches from the development of large areas of derelict land right down to small-scale activities such as the creation of biotopes or of planting trees. The Emscher -Lippe Ecology Programme is combined with structural development aid from the European

[1] The Kommunalverband Ruhrgebeit (KVR) is Germany's oldest association of local authorities. It is a public service body, with the right to self-administration. Since 1920 the KVR has been responsible for the overall planning and promotion of the Ruhr district, one of the most densely populated regions in Europe (5 million people). The main responsibilities are: urban and regional planning, urban construction, industrial settlement, public relation for the Ruhr district and ensuring that the Ruhr, remains a pleasant region to live in, and an attractive location for businesses.

Community (action plan for the coal fields). Between 1991 and 2000 (first decade) the government of North Rhine Westfalia and the EU (Aim 2) has financed over 270 projects with a volume of nearly 200 Mio. ¤. For the second decade, 2000 - 2006 (2008) the Government of North Rhine Westfalia and the EU finance nearly 70 Mio. ¤ for new projects. The holder of the projects are the local authorities and the KVR.

Look out and park maintenance

During the ten years between 1989 and 1999 the development of the green framework Emscher Landscape Park began (figure 4). After 1999 the planning and realisation are going on. In 2001 all participants worked on a new action-program called "ELP 2010" (here you can find action points for the future). The public finance is certain until 2006. The state NRW wants to promote the projects together with the European union with 70 Mill. ¤
In the third decade it is the aim to build up regional park maintenance. As in the planning process so far, regional park management, decentralised maintenance and local participation are to cooperate and provide mutual support while the Emscher Landscape Park enterprise gets underway.

4

Rebuilding of Emscher River System

The River Emscher flows 70 kilometres from east to west trough the northern Ruhr Area. It became an open space sewer 100 years ago, when the population grew by hundreds of thousands and industry started to increase. Until now it is the main part of the over ground sewer system for more than 2 million inhabitants. In the future, this river will be a symbol of the ecological regeneration of the whole region (figure 5).

This guideline project is tightly connected to Emscher Landscape Park. During the next 15 years landscape development in the surroundings of River Emscher depends on the progress in rebuilding this wastewater stream.

5

Exemplary projects

Shrubbery garden House Ripshorst –
Is a new park in the Emscher Landscape Park on an agriculture place, just in the middle of the town of Oberhausen. It will be a park, which shows the historical development and the beauty of the trees in this area from before the ice age up to now.
One of the important parts of this park is a new bridge for hikers and bikers over the Rhine-Herne-Shipcanal. The park contains the "house of nature" (figure 6) and since 1999 this house is the site of the Central Exhibition of the Emscher Landscape Park

Duisburg-Nord Landscape Park
The landscape park in North Duisburg is an outstanding example of a landscape park shaped by industry. The heart of the park is a disused Thyssen Steelworks - a unique historic setting, and now a place of industrial heritage and at the same time a venue for different leisure-activities. It covers about 200 hectares, mainly brownland. The conservation of testimony of the industrial era and the growth of spontaneous vegetation play a major rule in the parks design. Combining these with new design elements formed a park that can bee seen to embody a new direction in European garden art. Information boards and signposting indicate various routes around the park (including the Emscher Park Cycle Parkway), such as the industrial history and natural history trails Point of the Route of Industrial Nature)

6

Garten Osterfeld - OLGA Park - Oberhausen
The OLGA Park in Oberhausen is yet another example of the transformation of an industrially formed landscape into an industrial landscape park. New routes and bridges link the built-up area with the regional greenbelt B of the Emscher Landscape Park. The realisation of this park started in 1996 and the park was opened in springtime 1999. The park has a size of 25 hectares.

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Nordstern Landscape Park

The grounds of the former Zeche Nordstern coal mine have been turned into an outstanding example of an industrial landscape park. Along with the Nordstern commercial park, attractive landscape and park design were first presented here within the framework of the federal garden show in 1997 (figure 7).

The park is situated in Gelsenkirchen at the Rhine-Herne-Shipcanal. The concept for the Nordstern Park integrates several of the central working spheres of the IBA - Emscher Park: Finding new-uses for industrial and colliery sites and the architectural monuments they contain. To create modern commerce, services and a science park under the motto of “Working in the Park“ with the following quality goals: landscape quality, urban development quality, architectural quality and ecological remodelling of unused industrial sites for leisure-seekers. The park has a size of 100 hectares.

Mechtenberg Landscape Park

The planning covers a 290-hectare area in the urban triangle of Bochum, Essen and Gelsenkirchen at the southern end of the regional greenbelt C. In order to make this important recreational area in the immediate vicinity of the cities more attractive for the population, various design and accessibility measures were carried out.

Lakeside Park Lünen

This former industrial area in Lünen features abandoned brickworks, a waste stone heap and an old refuse tip. There are large subsidences and the river Seseke was an open sewage canal banked by dikes. It was redesigned for the Landesgartenschau Lünen 1996 as a recreational landscape with various uses. The park also included the historically significant park surrounding Schwansbell castle. Lünen Lakeside Park forms the core of the Seseke Landscape Park. The park has a size of 63 hectares.

Landmarks

The stone dumps and slack heaps are typical elements of the landscape in the Ruhr area and part of the industrial heritage. Within the framework of Emscher Landscape Park several heaps were designed by artists and landscape architects. Now dumps and heaps are important points of identification for the inhabitants and landmarks in the Region, visible from far away. For example:

Haldenereignis Emscherblick / Tetrahedron

Slag heap "Beckstrasse" raised between 1969 and 1993.

KVR is the owner since 1997. This slag heap is called "Emscher View" . The name was programmed, because the visitors enjoy a wonderful bird eyes view from the top of it. The earlier black and ugly heap changed into a green hill. Several paths direct to the top at 65 m high. You can also use the "Diretissima", a stair with 387 steps. On the top of the heap there is a huge steel pyramid, called "Tetrahedron" (figure 8). Inside the construction. There are 3 viewing platforms, the highest in 38 m, linked with stairs and fastened with steel ropes. The architect used the materials steel and stone, witch are a symbol for the industrial history of the region. In the night the pyramid is illuminated. In spite of the enormous dimensions the construction seems to be light and elegant.

Schurenbach Tip in Gelsenkirchen

In 1998, Richard Serra created a landmark that displays tremendous unyieldingness, both in the real and artistic sense. On climbing to the treeless heights of the Schurenbach tip, the first sight of the "Bramme für das Ruhrgebiet" (Slab) involuntarily brings to mind the uncanny encounter with the monolith in Arthur C. Clark's 2001 - A Space Odyssey. The 14.5 m high rolled steel slab crowns the Schurenbach tip and as a landmark it underscores the convex silhouette of the treeless spoil heap, while in shape and material it recalls the industrial products of this region.

Parkways Emscher Landscape Park - Cycle Path

The creation of easy access and more points of interest in the built up industrial environment was the idea behind the development of the Emscher park cycle and walking path. Running along a northern and southern route, the cycle path covers nearly 230 kilometres from Duisburg to Bergkamen,

whilst the walking path offers 130 kilometres of routes, also crisscrossing the region. Both path systems are signpost and integrated in the whole cycle paths of the region (figure 9).

Evaluation of achievements and failures

The International Building Exhibition was the offer to restore the old industrial Region, to remove location disadvantages and to improve the ecological, social and urban conditions in the Ruhr district. The aim was to build examples in the different working fields to give a mighty impulse for durable (dauerhaft) change.

Emscher Landscape Park was and still is a massive exercise in landscape design. During the first term of ten years (1989-1999) it was intended to achieve the planning preparation and carry out exemplary projects.

Within the second decade (2000-2010) we succeeded in establishing the implemented structures. The inter municipal working parties are working continually. With the support of public promotion, the projects can be realized step by step.

The main point of the 3rd Decade (2010-2020) of implementation will be rebuilding River Emscher and at the same time landscape development in the new Emscher valley.

This strategy succeeded in main points. Today, 14 years alter starting the work we can present astonishing progresses.

The essential Achievements are:
The system of open spaces is becoming a new structural framework (Gerüst) for the Region step by step. The Main Parts of this framework are:

- The system of walking and cycle path
- Several different kinds of open spaces
- The industrial nature route (as a part of industrial heritage)
- And the route of landmarks (figure10).

All together the 17 communities, Emscher Cooperative and KVR has realised about 300 different open space projects up to now. This is a solid foundation for a new landscape quality in the Emscher Region.

On the other hand there is still a lot to do. The substantial Failures are:
During the last years different holding models were suggested and discussed. But until today we have not succeed in furnishing a regional holding for Emscher Landscape park. This circumstance depends on the difficult political and administrative situation of the Ruhr. Thus a durable care and maintenance of the individual projects are not satisfyingly organised and the question of the sustainable quality assurance arises inevitably. The first step in this direction is the installation of the working group for Emscher Landscape park cycle track. In this point we experience the first regional holding for an important Project.

But in the long run it is substantial to find a holding construction Emscher Landscape Park that will manage planning, maintenance and public relation and which is responsible for coordinating the participants and the finance.

Masterplan 2010

During the 1st decade the development of Emscher Landscape Park was supported by the International Building Exhibition effectively. Alter the final presentation the situation changed. Now in the 2nd decade this task must be taken over by Project Ruhr. Masterplan 2010 will be both, the timetable and yardstick for the further development of Emscher Landscape Park. Finally Masterplan will formulate

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an updated picture of the spatial and strategic situation of the Park development (figure 11).

The process of Leitplanung and Rahmenplanung must proceed in consideration of the changing conditions. The main point will be the regional and durable co-operation of all participants. Until now, Emscher Lanscape Park has not ben established at all, especially during this time of economic recession.

The Masterplan should be a process to find both new pictures and visions for the park, and strategies which will ensure the quality and brightness of the projects.

This process began with the conversation of all participants at the end of last year.

The next steps are:

- Formulating new development yardsticks in co-operation with all participants
- Concretising the spatial planning
- Main point of development will be the new Emscher Valley tightly connection with rebuilding River Emscher
- Suggestions for new projects and new park surfaces

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Applying Science, Planning, and Partnerships to Connect Habitats Near Los Angeles, California: Experiences from the Santa Monica Mountains national Recreation Area.

I. THE SANTA MONICA MOUNTAINS NATIONAL RECREATION AREA

A. Legislative Background

The Santa Monica Mountains National Recreation Area (figure 1), a unit of the National Park System,was established in 1978 to: preserve and enhance its scenic, natural, and historical setting...for the southern California metropolitan area while providing for the recreational and educational needs of the visiting public.

The park was established to preserve unique and valuable natural and cultural resources, and the park management should focus on maintaining these values by maintaining natural ecosystem integrity.

But, unlike most other "traditional" U.S. national parks there are some unique aspects of the legislation and characteristics of the Santa Monica Mountains National Recreation Area:

- The U.S. National Park Service can continue to actively acquire land in the recreation area to protect resource and recreational values (subject to the availability of funds).
- Parklands in the recreation area are managed by multiple agencies, including the National Park Service and state and local agencies.
- And, there was recognition that development and private property will occur throughout the park and that the National Park Service should work with these neighbors to improve resource preservation.

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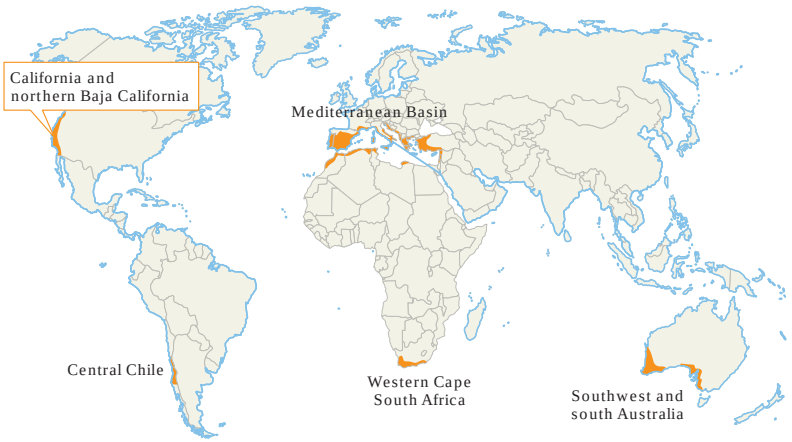
B. Natural Resource Overview

The park is composed of a mosaic of varying land ownerships and land uses spread over 61,000 hectares in the Santa Monica Mountains. The park is adjacent to Los Angeles (LA) (figure 2), and literally bisects LA at its eastern end. Across the range, the mountains extend approximately 75 km east to west and are about 13 km wide (north to south).

Within this east-west trending or transverse mountain range there are tremendous natural resource values. The mountains are geologically complex and characterized by steep, rugged terrain of mountain slopes and canyons. Elevation ranges from sea level to nearly 1000 m.

This topographic and geologic complexity translates into a high ecological diversity. Topography,



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climate, soils, and a variety of other factors have lead to a diversity of vegetation types within the mountains.
of chaparral, coastal ecosystems, riparian areas, oak woodlands and savannas, grasslands, and many other community types.

The Mediterranean-type Biome (figure 3):

These are all part of the diverse and increasingly rare complex of vegetation communities adapted to the southern California Mediterranean-type climate of wet winters and warm, dry summers.
Mediterranean-type ecosystems occur in only five locations on earth, including South Africa, western Chile, along the coast of Australia, in the Mediterranean region, and in southern California.

The global significance of Mediterranean-type ecosystems is becoming increasingly recognized. In particular, recent studies have identified Mediterranean-type ecosystems as among the most significant natural areas left in the world.

Mediterranean-type ecosystems:

- Are among the rarest biomes in the world;
- Contain a tremendous diversity of rare and often endangered species
- And, have the highest level of human disturbance for any biome.

As a result, undisturbed examples of Mediterranean-type ecosystems are very significant and very rare. In the Santa Monica Mountains and southern California, the significant characteristics of Mediterranean-type ecosystems are apparent (figure 4):

- The region is globally recognized for its unique and imperiled biodiversity;
- One of four North American hot spot for endangered species in the U.S.A.
- It contains 25 threatened and endangered species and over 50 candidate species.

The Santa Monica Mountains National Recreation Area protects one of the largest examples of this type of ecosystem left anywhere. There are similar conservation challenges in other Mediterranean-type regions. In the Santa Monica Mountains, we are actively seeking conservation partners from around the world to share experiences, expertise, and lessons.

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Wildlife Resources:

The vegetation diversity in the Santa Monica Mountains provides habitat for abundant wildlife:

- 50 species of mammals, including bobcats, mountain lions, deer, etc.
- Nearly 400 species of birds.
- Over 35 species of reptiles and amphibians.

In addition, consistent with other Mediterranean-type ecosystems, the Santa Monica Mountains contain a number of rare and sensitive communities:

- perennial grasslands
- coastal wetlands
- live oak savannas
- coastal sage scrub

The mountains also provide habitat for 25 threatened and endangered species and

nearly 50 additional candidate species or species of special concern. All of these species and natural resource values occur immediately adjacent to the Los Angeles Metropolitan Area [Hollywood sign is in the Santa Monica Mountains].

Cultural Resources:

Includes over 1000 archeological sites, cultural landscapes representing important historic periods (e.g. filming), historic structures, and other culturally significant areas.

C. Management Complexity

The Santa Monica Mountains National Recreation Area includes a complex array of different land owners, including state and national park lands, other public lands, and many private landowners:

- National Park Service land (about 8100 ha)
- State Park land (over 16,000 ha)
- Other parkland -- Santa Monica Mountains Conservancy (about 4,000 ha)
- Remaining 30,000 ha (about half of Santa Monica Mountains is private (e.g. entire City of Malibu)

In addition, over 60 agencies have some form of regulatory authority on lands within Natural Recreation Area boundary -- including federal, state, local agencies and other groups.

At the same time, of all the land within the boundary, over 90% is undeveloped (including parkland and private undeveloped parcels).

So, most of the mountains exist as open space which contributes to current ecological integrity.

This provides the opportunity to protect those areas that are most essential toward preserving ecosystem values and ensuring that resources persist, including identifying and protecting critical connections between the Santa Monica Mountains and nearby conservation lands.
But we must act now because ecosystem threats abound.

D. Natural Resource Threats

The overriding concern is the threats to resource preservation from increased development, for example the proposed developments in the Santa Monica Mountains NRA.

A number of specific ecological concerns:

1 Outright habitat loss

- About half of the mountains are protected as park land -- the rest could potentially be lost to development.

2 Development encroachment on natural areas – Edge Effects (figure 5)

Urban-associated impacts may include:
- Increased human access that may disrupt sensitive species.
- Urban-associated predators that may invade natural areas (e.g. house cats).
- Urban-associated competitors which may displace natives (e.g. plants, Argentine ants, roof rats, etc.).

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3 Habitat fragmentation

- The subdivision of habitats conducts to local species extintions.
- Impacts may be particularly severe for wide-ranging animals with low densities, such as large carnivores.

4 Alteration of habitat and related urban impacts

Human activities are having wide scale impacts on remaining natural areas:
- Increased fire frequency and vegetation type-conversion.
- Alteration of wetlands and streams.
- Air pollution.
- Etc.

E. The Conservation Challenge:

How do we identify and protect land and resources given tremendous ecological values, ongoing ecosystem threats, management complexity, and limited funding available for conservation?. Prioritization is required.

To meet this challenge, in 1998 the National Park Service adopted, in cooperation with other agencies and the public, a resource-based land protection plan. This plan leads to a comprehensive land protection strategy based on the best available scientific information.

II. LAND PROTECTION PLANNING

To develop this plan, the National Park Service followed a planning process that included the following steps:

First, we identified a series of Conservation Criteria that are used to prioritize land protection. These criteria define why areas in the Santa Monica Mtns are valuable from a resource perspective, and are being used to identify which areas are most critical to protect based on the resources they contain.

The second step in the process was to collect the data necessaryfor addressing the criteria. We need to know the distribution and status of resources in order to protect them.

Once sufficient data were collected and linked to the conservation criteria, GIS techniques were used to overlay resource values and identify those areas in greatest need of protection. In other words, the criteria were used to identify land protection priorities.

Finally, a variety of strategies are being implemented to actually protect land on-the-ground.

A. Criteria for Conservation Value

Through a series of efforts which included technical workshops, comprehensive surveys of other land protection agencies, meetings with technical experts, and public comment we arrived at ten conservation criteria. The criteria are divided into three broad categories: Natural Resources, Cultural Resources, and Recreation/Education Criteria.

Natural Resource Criteria:

- The site increases the size of a protected core habitat area.
- The site contributes habitat connectivity by serving as a habitat linkage or movement corridor for wildlife.
- The site is of high "ecological value" for a variety of species.
- The site is known to contain sensitive species and/or communities or contains critical habitat for

sensitive species.
- The site is inappropriate for development due to natural condition constraints.

B. Data Needed to Support Criteria

To apply the criteria across the mountains, we need to know the distribution and status of resources in the Santa Monica Mountains. In other words, we need scientific data to support the criteria.

As these data are collected, they are integrated into GIS layers representing resource values in the mountains.

Subsequently, these layers are combined to produce maps of significant natural, cultural, and recreational areas. These results are then used to set priorities for land protection. But, the success of the process and our ability to actually protect significant lands depends on the quality of the data used to identify resource values.

In other words, we need state-of-the-art, scientifically-based information on resource distribution and status in the mountains.

At least for the natural resource criteria, this means linking Conservation Science to Land Protection Planning.

To do this, we have initiated work on a number of top priority projects to collect data needed for enlightened land protection decisions. These projects include basic biological studies as well as applied research efforts, and the projects are being conducted in cooperation with park scientists, university researchers, graduate students, interns, and volunteers.

Three conservation science initiatives were designed to help us learn more about natural resource distribution and status, consistent with the conservation criteria we are using to identify significant lands in the mountains:

- Distribution of sensitive plant species.
- Inventory and monitoring of reptiles and amphibians.
- Distribution and status of carnivores.

III. INFORMATION NEEDS: ONGOING CONSERVATION SCIENCE INITIATIVES

A. Distribution of Sensitive Species: Plants

Consistent with other Mediterranean-type ecosystems, the Santa Monica Mountains contain habitat for a number of rare and sensitive species (this is especially true for plants: 10 threatened and endangered, 25 of special concern). In order to protect these species, it is critical to:

- understand their current distribution;
- identify other locations in which they may occur;
- and, generally identify conditions necessary for their survival.

As a first step in this effort we surveyed local experts and consulted numerous datrabases in an attempt to conclusively map all known locations for sensitive plants.

This was followed by extensive field work confirming locations using Global Positioning System (GPS) technology. These distributional data were then compiled into a GIS database of rare plant locations for the entire Santa Monica Mountains (figure 6).

Of course, this type of distributional information will be critical for protecting known occurrences of

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these species. But, perhaps more importantly, we need to know of other areas where these species may occur.

For this, we are collecting detailed information on a variety of attributes associated with each plant species location. This information is being used (in combination with other geographic data) to model potential habitat for sensitive plants.

We can use these data to identify areas for future surveys and to help us understand what ecological factors influence particular species distribution patterns.

This could be important for land protection efforts and for restoration projects (e.g.: Distribution of Dudleya species complex).

In addition, for rare plant species to survive, we need to know the ecological requirements of the species. Thus, we are also pursuing species-specific studies (e.g.: Studies of Lyon's pentachaeta soil requirements and pollinators).

Hopefully, we can identify and protect critical species and habitats, restore conditions necessary for their survival, and ensure persistence through understanding.

B. Inventory and Monitoring of Reptiles and Amphibians

In the Santa Monica Mountains, reptiles and amphibians serve as important indicators of ecosystem health. Several species are threatened by human activities, including urban encroachment, changes in habitat amount and quality, and introduction of exotic species. Also, of the 35 reptile and amphibian species that occur in the Santa Monica Mountains, 13 are listed as protected or sensitive species.

The status and distribution of these species can help us identify high quality habitat areas, human-related ecosystem threats, and mitigation measures to reduce threats.

Thus, we have initiated comprehensive population level surveys of reptiles and amphibians across the Santa Monica Mountains. In this work, two techniques are being used:

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- Stream surveys for aquatic species.
- Pitfall trap arrays for reptiles and terrestrial amphibians.

1) Start with an overview of Stream Surveys.

For amphibians and other aquatic organisms - stream assessments of all major streams in the Santa Monica Mountains (35 streams assessed over the last two spring seasons).

500 meter stream segments are evaluated for habitat conditions, physical stream characteristics, aquatic invertebrates, exotic animal species, and, of course, native amphibians (figure 7).

The effort has involved extensive ongoing fieldwork, and is part of a large interagency partnership with universities and other agencies.

For native amphibians, we not only census adults (for exemple newts ans egg masses) but also determine whether or not successful breeding is occurring.

The overall patterns are very dramatic. Urban streams have:

- More water availability but lower water quality.
- Very different physical characteristics.
- More exotic species.
- Fewer native amphibians.

Species and site-specific mechanisms vary, and include physical and bio impacts. For example, the introduction of exotic species, especially crayfish, impacts to Census adults newts and Census adults treefrogs, among others.

Ultimately, results will point to highest quality habitat, serve as indicators of declining habitat conditions (indicators of ecosystem health), and provide information for restoring disturbed areas (e.g. removal and reintroduction prevention for exotic species).

2) Overview of Pitfall Trap Arrays for reptiles and terrestrial amphibians.

Pitfall trap arrays are being installed in four regions of the mountains. Each is "ecologically unique". Focusing first on Simi Hills and urban patches.

Arrays consist of pitfall traps connecting by drift fences. Animals follow drift fences and fall into buckets. Snake traps are incorporated into the design. It is a widely implemented technique that is very effective at surveying a variety of species.

This same system is being implemented throughout southern California, again in a multi-agency partnership to understand broad reptile distribution patterns.

Historic data indicates presence for some species, but current work indicates' potential problems. Several factors have been indicated, generally related to urban encroachment and habitat fragmentation:

- Wide-ranging species are susceptible to roadway mortality and fragmentation impacts.
- Exotic Argentine ants have displaced native ants, resulting in the decline of horned lizards that only prey on native ants.
- Venomous rattlesnakes rapidly disappear from fragmented habitats, possibly due to direct persecution.
- Clear differentiations between sensitive species that are on the decline and a few others that tolerate human disturbances.

These findings are emerging from detailed studies on highly fragmented habitats. As habitats become more fragmented across the park, we expect to see changes in species composition and abundance. Direct implications for planning and wildlife management actions.

C. Distribution and Status of Carnivores

Because of habitat fragmentation, development encroachment, and habitat loss, we are particularly interested in the distribution and status of wide ranging mammals, especially carnivores.

Initial analyses of habitat requirements for carnivores indicate that their persistence will depend on:

- how future developments subdivide remaining habitat;
- and, if carnivores can survive within and disperse between remaining habitat areas, including within and between the Santa Monica Mountains and surrounding regions.

To address these issues, in 1996 we initiated detailed work on carnivores, including bobcats, coyotes, gray foxes and other species as part of a cooperative effort between the National Park Service and several universities.

Through this research, we are:

- Assessing the population status of these animals, including information about demographics, vital rates, population sizes, and genetics.
- Determining the effects of habitat loss, urban encroachment, and fragmentation on their distribution, behaviors, and survival.

- Evaluating barriers to carnivore movement, including multi-lane freeways, smaller roadways, suburban developments, and other managed lands.
- Conversely, we are investigating what constitutes a viable habitat linkage or movement corridor for wildlife.
- We are also evaluating how future development scenarios may affect wildlife survival.
- And, most importantly, we are applying the results of the science to protect important wildlife habitats and linkages, design or restore wildlife movement corridors, develop wildlife management actions, and assist land managers in maintaining wildlife over the long-term.

Ongoing fieldwork has included three components:

First: Radio telemetry is being used to evaluate the movements of target species.
Animals are captured, radio-collared, and tracked to evaluate their distribution along the urban-wildland interface and to assess their use of potential movement corridors and habitat linkages.

For mountain lions, we are using Global Positioning System (GPS) collars to satellite-track the animals. This provides lots of data with great precision.

Second: Remote cameras are also used to evaluate wildlife distribution and estimate population sizes. Cameras have been especially valuable for monitoring potential habitat linkage areas or movement corridors, and they are triggered by animals, either by crossing infrared beams or by stepping on hidden pressure plates.

Third: Track stations with gypsum powder are used to evaluate the presence or absence of animals in areas that vary in their degree of human impact. Similar tracking techniques are also used to monitor roadway crossing points.

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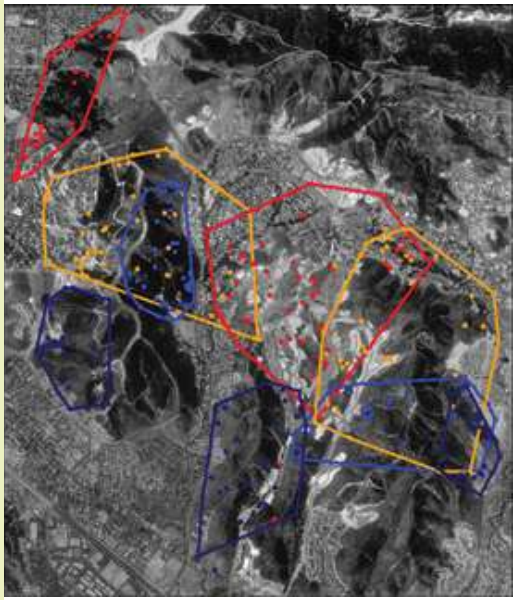

IV. SOME RESULTS WITH RELATED APPLICATIONS

A. Habitat Use with Respect to Development

Since our work began, we have monitored over 100 bobcats, well over 100 coyotes, and 25 gray foxes using radio telemetry. We are especially interested in carnivore habitat use with respect to development proximity.

For example, we have been assessing how carnivores utilize habitats in the natural areas and in areas amid urban development. Are there habitats of particular importance? Do these vary among species? Between sexes and ages?

For this analysis, we have compared animals that frequent urban developed areas vs. those that spend their time further away within core habitats.

What we have learned:

Although all animals clearly prefer the natural areas (including coyotes), male bobcats occur in urban areas more frequently than female bobcats (blue).

So, male bobcats (red and orange) disperse through fragmented areas and occupy sites along the interface, but females (blue) most often avoid these habitats (figure 8).

Management Implications: Despite the presence of bobcats in fragmented areas, over time, populations may disappear. No females, no persistence. This information supports protecting large, unbroken blocks of habitat and clustering developments where they do occur.

B. Survivorship and Mortality Factors

Some of the most interesting findings have been with survivorship and mortality data. In particular, the most significant mortality factor for bobcats and coyotes has been human-caused. Most mortalities are due to roadkill.

Interestingly, urban-associated animals do not have higher human-caused mortality rates.
Why?. Likely because the human-caused threats predominate throughout the study area, including along the urban edges and deep within the "natural areas".
A vivid example illustrates this with bobcats along a well-traveled road through the Santa Monica Mountains. The animals studied are "natural habitat animals" meaning that they live in the natural areas, not in and around urbanization. But, if home range crosses the road, the animal has died from a vehicle collision.
Predation has also been an important source of mortality, particularly for gray foxes. In fact, it appears that coyotes may exclude gray foxes from fragmented urban interface areas; coyotes do well in these areas and gray foxes may be less able to work their way between habitat patches and human-disturbed areas when coyotes are abundant. Human-associated land use changes alter habitats to favor coyotes, reducing the prevalence of foxes.

Management Implications: Human activities and development patterns can have tremendous effects on survivorship and species composition. Effects can be widespread and penetrate into relatively large protected areas. Landscape and development patterns are key, and measures must be taken to soften the impacts of human activities on wildlife.

C. Corridors and Barriers - Crossing the 101 Freeway

What about roads as barriers? Roads of all sizes are pervasive across all of the Santa Monica Mountains and surrounding regions.

Our findings suggest the large freeways are formidable barriers (e.g. 101 Freeway) while other (smaller and less busy) freeways (e.g. Highway 23) may be mortality sinks (e.g. animals attempt to cross, but die trying) (figure 9).

Good news and bad news: Large roads have fewer animal mortalities...but...,
large roads become complete movement barriers.

Are there ways to mitigate fragmentation impacts from roads? Can movement crossing points under freeways work? Are they used by wildlife? If so, where and how?

No wildlife-specific crossing structures exist in and around the Santa Monica Mountains. What we have are potential crossing points designed for other purposes (e.g. drainage and flood control, frontage roads, etc.). Are these used by animals? Track station and camera monitoring results within underpasses suggest use by a variety of species, including: Mountain lions, bobcats (figure 10), coyotes, raccoons, etc.

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For carnivores, the dimensions of the crossing point appear less important than the quality and availability of habitat in the vicinity of the crossing point.

Wild animals will use a variety of crossing points – big, small, long, short – but they must be located in areas and connect regions where habitat is protected and available.

Management Implications: We are now working closely with local agencies, including the California Department of Transportation (Caltrans), to incorporate the findings into more wildlife-friendly highway designs. Fencing, crossing structures, and landscaping are all examples currently being implemented.

And, critical areas required to maintain habitat connectivity are also being identified in a broad, multiagency effort.

D. The Big Picture - Mountain Lions

To understand landscape-level connectivity, we just began work with mountain lions.

Connections between the Santa Monica Mountains, Simi Hills, and Santa Susana Mountains – connectivity and viability of the park at a regional scale.

Example from 3 months of monitoring of one individual, a 62 Kg. male captured in July 2002: Extremely large home range (388 km2) that encompasses nearly the entire Santa Monica Mountains range. Locations include several near developed areas in Malibu and well-used recreational sites across the Santa Monica Mountains. But, no one has reported seeing the lion.

Management Implications: The animal has been staying out of harm's way, doing what lions are supposed to do, and doing so next to one of the largest metropolitan areas in the world...

But, its confinement to the Santa Monica Mountains clearly indicates the need for habitat connectivity. Long-term survival will depend on identifying and protecting critical movement corridors between the Santa Monica Mountains and nearby mountain ranges.

Population survival is possible, but not without regional connectivity.

V. CONCLUSION: LINKING SCIENCE AND CONSERVATION TO PROTECT THE SANTA MONICA MOUNTAINS

Overall, by linking science to land protection planning and biodiversity protection, we hope to develop a realistic conservation program based on the best available data.

- Data collected through scientific partnerships are linked to land protection planning.
- Priority areas are identified, resource impacts and threats are determined, mitigation actions are developed, and ecological values are protected.
- Ultimately, on-the-ground actions are implemented through interagency efforts. In the Santa Monica Mountains and across southern California, many agencies and cooperators are working together — some examples are shown here.

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This general approach is not unique to the Santa Monica Mountains. Indeed, the success of efforts in the Santa Monica Mountains will depend on our links to other areas in the region.

Recognizing this regional connection, the U.S. Congress is now considering plans to greatly expand the National Recreation Area with the Rim of the Valley Corridor (200,000 ha) (figure 11).

Beyond the Santa Monica Mountains and Rim of the Valley, similar efforts are underway to identify and protect lands across southern California. For example: South Coast Wildlands Project identifying "Missing Linkages."

The State of California has established the Rivers and Mountains Conservancy.

Because of the resource values and complex land management patterns in southern California, conservation success depends on these types of

comprehensive, interagency programs that focus on identifying and prioritizing conservation needs.

Other regions of the world with similar conservation challenges could utilize similar approaches — we have already initiated partnerships with South Africa and Chile... and informal work with other European countries.

Will we succeed? I believe we are on the right track. Time will tell of the ultimate success of our efforts. In the meantime, we have an opportunity to learn a tremendous amount in this natural laboratory and simultaneously protect an outstanding ecological treasure -- the Santa Monica Mountains National Recreation Area.

Castell, Carles

Doctor in Biology (specialised in Ecology) and MA in Environmental Management in the Rural World. For ten years he was a university researcher on projects about the dynamics of Mediterranean land ecosystems. Since 1994 he has worked in the Natural Spaces Area of the Barcelona Provincial Council, where he has carried out research and follow-up programmes, natural park management and, over the last few years, analysis and planning of natural spaces. He is also a lecturer in ecology at the Higher Graduate Programme in Landscaping at the Polytechnic University of Catalonia.

S I T X E L L: a Territorial Information System for the Multidisciplinary Analysis of Open Spaces in the Province of Barcelona

Introduction

Land planning based on the existence of a system of functional open spaces must necessarily start with an analysis and evaluation of the characteristics and attributes of this series of spaces from a multidisciplinary perspective, taking into account their natural, economic and social values.

In the Mediterranean region, where the modern-day territory is the result of the ancestral implementation of highly diverse uses leading to a complex mosaic (figures 1, 2, 3), territorial planning that is both global and multifaceted is necessary when approaching the analysis of the numerous elements and processes that are involved. Thus, the discipline of landscape ecology constitutes a solid conceptual framework for approaching the classification and analysis of open spaces in order to understand their characteristics and the main dynamics being generated.

Within this context, the Area of Natural Spaces within the Barcelona Provincial Council has implemented the Territorial Information System for the Network of Open Spaces in the province of Barcelona (SITXELL), a project devoted to obtaining, organising, analysing and evaluating information on land protected from building.

The main goal of SITXELL is to provide support to the local government's policies on open spaces, so that the territory's socio-economic development is made compatible with the ongoing functionality of the natural systems.

Organisation of SITXELL

SITXELL is a territorial analysis project organised using the technology of geographical information systems (GIS), aimed at studying and evaluating land protected from building in a holistic way, with the purpose of providing them with structure and making explicit the meaning of the open spaces within the territory as a whole.

SITXELL has been constructed on the basis of a multidisciplinary territorial information system which incorporates the numerous facets that converge when defining the characteristics of open spaces; it is flexible in that it allows global or partial analyses of the territory to be made from various different standpoints; it is balanced in that it takes into account the importance of diverse factors of interest; and it is clear, rigorous and distanced from prior assumptions that could bias the analyses, such that the results are reliable and applicable.

SITXELL started with an organisation based on thematic modules which cover the different aspects that define the interest of open spaces and allows the meaning of the spaces to be defined depending on their geological, botanical, faunistic, ecological, social and economic characteristics, taking into account both basic parameters and complex indicators. The fundamental conceptual organisation of the system is as follows:

- Environmental Modules. This includes the following modules: geology; hydrology; flora, vegetation and habitats; fauna; landscape ecology; cultural heritage; and landscape.

- Usage-based Modules. This includes the following modules: socio-economic; sectoral regulations and directives; urban planning and land development; transport infrastructures; and technical services.

Each of the modules contains several different basic information areas – some which were pre-existing while others had to be developed based on diffuse information gathered or newly-generated information – as well as coverage of sectoral assessment, which is produced by transforming and combining the different basic layers.

Technical characteristics of the project

The IT working environment for the SITXELL project is the ArcGIS programme, mainly due to its analytical capacity as well as its compatibility with the main types of cartographic and alphanumerical files. The project was organised and is mainly managed by ArcInfo, with which the most complex analyses are also carried out. The programme ArcView is the usual working environment for viewing, making inquiries, combining and transforming the layers, while a user-friendly specific display has been developed in order to enable the different user groups involved, some of whom may be inexpert in the IT language of GIS programmes, to consult the information.

The scale chosen for the SITXELL project is 1:50,000, a scale of compromise which allows a sufficiently detailed view in order to show the main features and processes related to the dynamic and planning of the open spaces and to be able to display the role of the different municipalities in this global framework, and which simultaneously is an appropriate scale to undertake the project in the short term. Using this scale also provides further advantages. First, there exists a recent cartography of the entire province using this scale, of which the Barcelona Provincial Council is co-owner, and which is to be updated on a regular basis. Secondly, this is a scale that is frequently used in numerous tasks involved in territorial inventory, analysis and planning, which allows this information to be incorporated into the SITXELL system in a relatively simple way.

Nevertheless, SITXELL allows for the inclusion of information on more detailed scales (1:25,000, 1:10,000 and 1:5,000), as in fact happens with many of the areas in which coverage is already available, in which the data bases have reached a scale of 1:25,000, even though the reference scale is always kept at 1:50,000 when carrying out global analyses co-ordinating the different thematic modules.

Participants in the project

The following groups of experts currently participate via agreements: The Laboratory of Geographical Information and Teledetection (Laboratori d'Informació Geogràfica i Teledetecció - LIGIT) and the Department of External Geodynamics and Hydrogeology from the Autonomous University of Barcelona; the Group on Geobotany and Vegetation Cartography, and the Bonelli's Eagle Study Group from the University of Barcelona; the Centre for Ecological Research and Forestry Applications (Centre de Recerca Ecològica i Aplicacions Forestals - CREAF); the Study Centre for Mediterranean Rivers (Centre d'Estudi dels Rius Mediterranis – CERM); the Catalan Institute of Ornithology (Institut Català d'Ornitologia – ICO); Minuartia, Environmental Studies; the Farmers' Union; and the Bages County Council.
Likewise, within the Barcelona Provincial Council, in addition to the Area of Natural Spaces, which provided the impetus behind SITXELL via its Technical Office of Territorial Planning and Analysis, other participating entities include the Technical Office of Cartography and Local GIS, and the Information Technology and Telecommunications Service. Other administrative bodies, such as the Generalitat de Catalunya's Department of the Environment, have also facilitated certain basic information areas which have been included in SITXELL.

Current status

A good part of the basic information for the SITXELL project is now available, mainly data referring to the various areas covered in the environmental module. Below is a list of the main cartographic bases that have already been included in each of the modules:

- Geology: Lithology, geomorphology, risks, elements of interest.
- Hydrology: Aquifers, flood-proneness, river bank habitats and the assessment of shore systems.
- Flora, vegetation and habitats: Habitats, species and communities of interest, overall assessment.
- Fauna: Distribution of species, assessment of communities and species indicators.
- Landscape ecology: Organisation, flows, indicators of heterogeneity, fragmentation, connectivity, diversity.
- Cultural heritage: Features of the natural and man-made heritage.
- Socio-economic: Land uses; analysis of the agricultural, livestock, forestry and mining sectors; urban planning.

Likewise, as a step prior to disseminating the basic information and the sectoral and global analyses for the entire working area, a pilot area of slightly more than 500 km2 has been set aside as representative of the landscape in the province. This area serves as a basis for trials to test the methods of obtaining information and of transforming and combining the basic areas covered. Thus, in this initial stage, potential problems related to either the structure of the GIS or any of the specific areas, or to the co-ordination among the different working groups participating, will come to light.

Once the potential anomalies and gaps are rectified, the system – now finely-tuned and validated – will be disseminated throughout the entire province, the stage that is currently underway. Below are some of the preliminary results obtained from the pilot area, which already demonstrate some of the potentialities of the

SITXELL project within the framework of the strategic planning of open spaces.

Among the sector-based areas of analysis covered which have been tested to date, we can mention geological risks, geological features of interest, habitat assessment, assessments of bird populations, the establishment of various indexes of landscape ecology (diversity, fragmentation, connectivity) and agricultural dynamism. As an example, in the present article we have furnished the map on habitat assessment, based on the combination of variables related to the habitats' conservation value, such as rarity, frequency and successional status (figure 4). We have also supplied the map on agricultural dynamism, through the comprehensive analysis of the economic potential and the agricultural structure of each type of use (figure 5). In both cases, the analyses enable the open spaces to be classified according to their attributes and values, and ultimately in terms of their degree of interest.

On the basis of these sectoral analyses, several global analyses have also been tested, in which the areas covered are combined in order to obtain a multidisciplinary assessment of open spaces. As an example, a possible global assessment map is shown (figure 6) using five categories, which are the product of the following combination of its sectoral attributes:

- Area of high environmental interest: This includes the areas of maximum interest due to their geological features, flora, vegetation, habitats, birds or landscape, and, as a result, those that would need specific protection in order to ensure the preservation of their existing values.
- Matrix of environmental interest: This encompasses areas of high interest due to their flora, vegetation, habitats, birds or landscape connectivity, or because they have hydrological or geomorphological risks. These areas require basic protection consisting of making their uses compatible with their existing values and risks.
- Area of high agricultural interest: This category corresponds to the areas with the greatest degree of agricultural dynamism, in which the agricultural, livestock and forestry sectors have a significant presence from the social and economic standpoint.
- Built-up area: Areas currently occupied by population nuclei and housing developments.
- Area not included in any of the previous categories: This is made up of the areas that exhibit none of the essential features needed to be included in one of the previous categories, and as a result whose function within the system of open spaces is less clearly defined. Depending on their characteristics, they could be used, if need be, for urban development with a relatively low impact on the territory (built-up areas, urban or periurban parks), or conversely their natural, agricultural, forestry or landscape values could be fostered through appropriate management.

Based on this overall assessment, various applications can be developed in terms of land planning for open spaces. One of these consists of setting forth strategic avenues of land development (figure 7), which are more broad conceptual directives on a macro-territorial scale than specific land use proposals, since many more parameters of analysis would need to be taken into account in order to make specific proposals. The strategic avenues propose the organisation of open spaces into functional groups based on establishing areas that are homogeneous to a greater or lesser degree in terms of their attributes, and which could thus be subject to similar planning and/or management.

As an example of this, we can see the potential establishment of an Area of Strict Protection, through the appropriate designation; a Forest Matrix, where the duly managed agricultural uses are perfectly compatible with the conservation of the environmental values; an Area of Forest Management, where specific management would have to be planned in an effort to improve the forests; an Agro-forestry Mosaic, where the present combination of agricultural, livestock and forestry uses would have to be conserved; an Agricultural Production Area, where the agricultural uses would have to be fostered, simultaneously making them compatible with the maintenance of the land values; and a Dynamic Urban Area, which would include the current urban areas and areas of possible expansion, where it is necessary to minimise the impact of man-made features on the land through appropriate planning.

Another possible application of the SITXELL analysis would consist of uncovering possible large-scale discrepancies between the assessment of open spaces and current urban planning. This exercise would, for example, facilitate the assessment of trends in urban growth around current population nuclei, where new urban settlements are frequently planned in areas with significant agricultural interest or with environmental risks instead of first occupying areas that are more appropriate for being built up. Another example would be the detection of developments located in areas of significant natural interest which are frequently allowed to expand.

These potential applications of SITXELL are simply the initial trials carried out in the pilot area on the basis of only part of the sectoral information. From now on, it will be essential to complete and update the basic information as well as to fine-tune and validate the system

of analysis in order to be able to apply it to all the open spaces in the province of Barcelona.

Conclusions

These initial phases in the SITXELL project already demonstrate the usefulness of landscape ecology as a conceptual framework for territorial planning in the Mediterranean context. The importance of having in-depth knowledge of the features and processes that participate in the dynamic of open spaces by defining, characterising and inter-relating their attributes is clear. Any consideration of land use based on this knowledge needs to have a corresponding geographic information system as a powerful, versatile instrument for land analysis and diagnosis. Having a clear theoretical framework and useful instruments will enable certain implementation trends to be corrected and missteps and frictions brought about by land occupation to be re-guided, and it will foster management practices that favour the value of the open spaces, making socio-economic development compatible with the preservation of the functionality of the natural systems.

de Juana, Fernando

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The Green Ring in Vitoria-Gasteiz: A Proposal for the Harmonious Integration of the City with the Territory.

The Green Ring as an Urban – Rural Ecotone.

Vitoria-Gasteiz, the capital of the Autonomous Community of the Basque Country (Spain), is a medium-sized city – with about 220,000 inhabitants – which is located in the centre of a territory characterised by the agricultural use of the flatter areas and the forested nature of the more mountainous areas. It is a compact city, with well-defined residential and industrial areas, in which suburbanisation has yet to become widespread (figure 1).

Nevertheless, one can talk about a periurban area where certain not very environmentally-friendly practices are much more widespread than in rural areas that are further away from the city. Characteristic examples of this include abusive occupation of the public domain (vegetable gardens, sheds, etc.) and unauthorised areas used for dumping sewage and solid waste. Intensive recreational use is also a cause of serious environmental problems, especially of those associated with unregulated motor vehicle traffic.

In response to this problem, at the end of the 1980s the Centre for Environmental Studies of the Vitoria-Gasteiz Town Hall began to consider the possibility of establishing a network of green spaces around the city that would act as a filter between the urban world and the surrounding rural area. This started on the basis of several existing natural areas with certain value, including the Zadorra river to the north, the wetlands of Salburúa to the east and the Armentia forest to the south-west. The conservation of these enclaves required them to be interconnected both among themselves and with the Montes de Vitoria – a natural hilly area of more than 5,000 hectares located to the south of the city – by ecologically functional corridors. The future "Green Ring" was thus completed by the restoration of certain degraded areas (with rubbish, abandoned gravel pits, etc.) and the environmental recovery of the two small streams that flowed south to north from the Montes de Vitoria to the Zadorra river.

However, in addition to the importance of their ecological role, the social functions that could be performed by these periurban green areas were also taken into account, viewing them not only as places for enjoying the outdoors but also as areas for hosting activities aimed at environmental education and awareness-raising (figure 2). From this standpoint, it was essential to ensure accessibility for the public, and thus from the start the idea was to join the peripheral paths into a network of routes that would allow for interconnection both from the city to the outlying green zones, and from the green zones to the surrounding agricultural and forested areas. In this way, the Green Ring became a type of anteroom to the natural spaces located near the city, thus encouraging access to them on foot or by bicycle.

The Green Ring was designed with a two-fold ecological and social purpose in mind, with both aspects being inseparably linked, thus posing the difficult challenge of making public use of the land and the conservation of environmental values mutually compatible, given that the goal in these spaces was to both preserve the diversity and complexity inherent in the natural ecosystems and to make it possible for the public to enjoy this valuable natural heritage.

In short, the objectives of the Green Ring were the following:

- To provide a comprehensive, integrated solution to spaces characterised by a unique problem derived from their location on the threshold of both the urban and rural domains.
- To encourage the conservation of natural values and biodiversity.
- To contribute to meeting citizens' demands for sites for outdoor leisure activities.

- To take advantage of the enormous potential of periurban natural spaces as educational and interpretative resources.
- To involve the public in the conservation of Vitoria-Gasteiz's natural heritage.

Planning and design criteria.

The forerunner of the Vitoria-Gasteiz Green Ring can be found in the 1986 General Plan on Land Development, which proposed completing the system of urban green zones by recovering almost 300 hectares of spaces protected from building in sites near the city. To do this, the classification of Periurban Park was created within the General System of Open Spaces, being defined as "large natural reserves of forested parks located near or bordering on the urban perimeter which are compatible for public uses and sporting, cultural, recreational, etc. activities without compromising their value". The Revised General Plan, tentatively approved in 1998, already explicitly mentions among its other proposals, "the establishment of a green belt of peripheral parks to serve as a membrane delimiting the city".

In this way, the Green Ring (figure 3) is made up of a series of spaces devoted to conserving nature and fostering public usage, in which any activity not related directly to these purposes is considered incompatible. As a result, a model of park has been chosen that, in terms of its uses, is closer to an urban green area than to a natural or rural park, since in the latter two the sustainable use of resources is allowed in general, and is even considered desirable. This is why the Green Ring was built on publicly-owned lands, which placed specific conditions on its planning and implementation.

Along with the almost 350 hectares that the Town Hall owned around the city as a result of the policy of expanding the municipal ownership of land which began in the 1970s, 150 hectares were added by the Álava Provincial Council, and another 100 by the administrative boards of the towns of Arcaya, Arcaute and Elorriaga – areas with lower populations within the municipal district of Vitoria-Gasteiz – through management concession agreements. Likewise, the execution of several construction projects related to protection against flooding within the city justified the expropriation of approximately 40 more hectares, which would later be added to by another 50 obtained through the same procedure.

The remaining areas needed to complete the Green Ring were included in the General Plan for Urban Land Development as general systems associated with unprotected land for building, and the ability to acquire them in a compulsory fashion and free of charge was derived from the execution of the city's different areas of expansion. This system, which greatly facilitates land acquisition, has the disadvantage of the land's ultimate delimitation being subject to the corresponding interim plans, since the determinations contained in the General Plan are only guidelines to this effect. The planning and execution of the Green Ring, as a result, was subordinate to the implementation of the city's growth plans.

On the other hand, the public ownership of all lands, the stringent restrictions on uses, and the exclusive responsibility of the Vitoria-Gasteiz Town Hall for administering space, are all factors that contributed to simplifying management considerably, making it unnecessary in practice to approve an internal planning document that was regulatory in nature.

Actions carried out.
In accordance with the objectives set, the interventions carried out to date in the Green Ring have been aimed at both fostering the value of nature and adapting the space for public use. These actions can be classified as follows according to their typology:

- Projects to restore and improve spaces (figure 4):
  - Restoration of degraded areas: forests, wet areas, river banks.
  - Restoration and enhancement of ecological corridors.
  - Improvement of the environmental conditions aimed at increasing biodiversity.
  - Plantings for landscaping and recreational purposes.
  - Minimisation of the impact generated by infrastructures such as electrical wires and communication routes.
  - Elimination of dumping grounds and polluted sites.
  - Improvements in areas devoted to public use.
  - Adaptation of the hydraulic functionality of the river flows and protection against flooding.

- The construction of infrastructure and facilities (figure 5):
  - Improvements to internal paths and connections among them.
  - Improvements to entrances to parking lots and parking places.
  - Water connection projects and the installation of fountains.
  - Installation of signs and other information elements.
  - Installation of outdoor furniture and fittings.
  - Facilities for environmental information, education and interpretation.

The evolution in the annual investment figures in the Green Ring since 1993, the year when the first actions took place, is the following, expressed in euros:

Investment (€)	Annual	Accumulated
1993	108.001	108.001
1994	176.953	284.954
1995	149.221	434.175
1996	54.019	488.194
1997	43.742	531.936
1998	645.190	1.177.126
1999	234.747	1.411.873
2000	596.356	2.008.229
2001	434.573	2.442.802
2002	921.831	3.364.634

These amounts refer exclusively to the amount spent on construction and improvement projects without including other items such as land acquisition, personnel costs, the drafting of projects and technical studies, maintenance, security guards or educational and environmental awareness-raising activities.

It can be seen that during the first five years, the total investment was of the order of 0.5 million euros, while in the five following years it rose to 2.8 million euros, reaching the maximum annual investment in 2002. These figures reveal the resolute push that the city is making on behalf of the Green Ring, with progressively greater investment.

The burden of financing the costs of investment, maintenance and management is fundamentally borne by the municipal budget, although aid has been received for specific actions from the European Union (Cohesion Fund, European Social Fund) and the Spanish Ministry of the Environment.

With regard to the nature of the actions carried out, these have rigorously conformed to the principles of economy of resources and integration into the environment. Although some areas near the city have been treated more like urban parks, the Green Ring in general lacks installations such as watering systems or public lighting. Almost all the surfaces are soil, and the information points, parking lots, fountains, outdoor furniture and fittings and rubbish bins are mainly located at the entrances. In this way, the costs of investment and maintenance are reduced, and this also encourages the users to develop an attitude of respect toward the environment, as is required in a natural setting.

The choice of materials used, which mainly consist of stone, steel and wood, was also determined using the criteria of economy, durability, ease of maintenance and appropriateness to the surroundings. The plants used are almost always native, the majority of them coming from a local greenhouse, and the design of the plantings is based more on ecological considerations than on landscaping considerations or aesthetic criteria. When planting grass, robustness and appropriateness to the environmental conditions are mainly taken into consideration, with priority being given to the use of slow-growing herbaceous species which do not need much water.

Assessment of the project.

The Vitoria-Gasteiz Green Ring currently occupies about 442 hectares, and plans include adding another 400 hectares in the medium-term (figure 6). Although there is still much to be done, especially in terms of connecting the different spaces within the Green Ring and connecting the Ring itself with the city, after ten years of work some results can already be discerned:

- Environmental benefits.

  The improvement in the ecological and landscape quality of various degraded periurban spaces has enabled many environmentally damaging practices that had been taking place there to be halted.

  Likewise, certain enclaves with high environmental value have been effectively conserved, and there is a noticeable increase in the biodiversity of both flora and fauna. The restoration of the wetlands (figura 7) around the Salburúa river is, without question, the most outstanding case of this, since what until five years ago was only a small remnant of the old wetlands that had once occupied the area, which had mainly been drained and was used for farming, is now today a valuable shallow lagoon complex of more than 60 hectares of flooded land. With more than 300 breeding pairs of aquatic birds, 2,000 individuals of wintering species, and various animal species of extraordinary interest (such as the European mink, the bittern and the agile frog), in a short period of time Salburúa (figure 7) has become foremost among the continental wetlands in the Basque Country due to its conservation value. In 2002, it earned inclusion in the Ramsar international convention on wetlands protection and was nominated as a Site of Community Importance within the Natura 2000 network.

- Social benefits.

  From the social standpoint, the development of the

Green Ring has contributed to balancing the existence of green areas among all the city's neighbourhoods, thus notably improving opportunities for accessing the natural environment. The improvement of these spaces provides new leisure time options for broad sectors of the population, especially older people. The influx of the public to these spaces, which reached a figure of 290,000 visitors in 2002, reveals the public's widespread acceptance of this municipal initiative (figure 8).

The numerous educational and environmental awareness-raising activities carried out in the Green Ring, aimed at both the school-aged population and the general public, reach approximately 25,000 people per year. Likewise, approximately 200 young people have attended training courses for employment in new environmental sectors that were held in these spaces.

The active role the community has played in this project by participating in many different campaigns and activities has contributed to citizens viewing the Green Ring as their own and has led them to be the main agents in its protection.

- Economic benefits.

Currently, the Green Ring is considered to be one of Vitoria-Gasteiz's tourist attractions, thus powerfully contributing to strengthening the image of a city known for its concern for the environment. However, the project's economic benefits can be seen more directly in the increasing property values of the residential areas near the new parks, due to the fact that citizens perceive a home's proximity to the natural environment as a plus in terms of quality.

The rearrangement of almost 100 hectares of land as a floodplain reservoir has solved a serious flooding problem in the city's industrial zone (figure 9). Along the same lines, there are plans for comprehensive improvements near the Zadorra river, including both environmental restoration of the river banks and the creation of protection against flooding in the city.

Finally, the creation of these spaces has paved the way for new employment opportunities, mainly in the sectors of maintenance and conservation of green areas and environmental education and communication.

Jackson, Joanne

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The City of Cape Town's Biodiversity Network : Goals and Implementation

1. INTRODUCTION

Cape Town is located on the south–western tip of Africa. The geographic area of the City is approximately 2 477km2, with an estimated 3,15 million people living within its boundaries and an annual population growth rate of approximately 3,5 %.[1] It experiences high in migration, especially from rural areas of the provinces of the Eastern and Western Cape. Figure 1 illustrates the geographic location of the City, and the urban extent (figure 1).

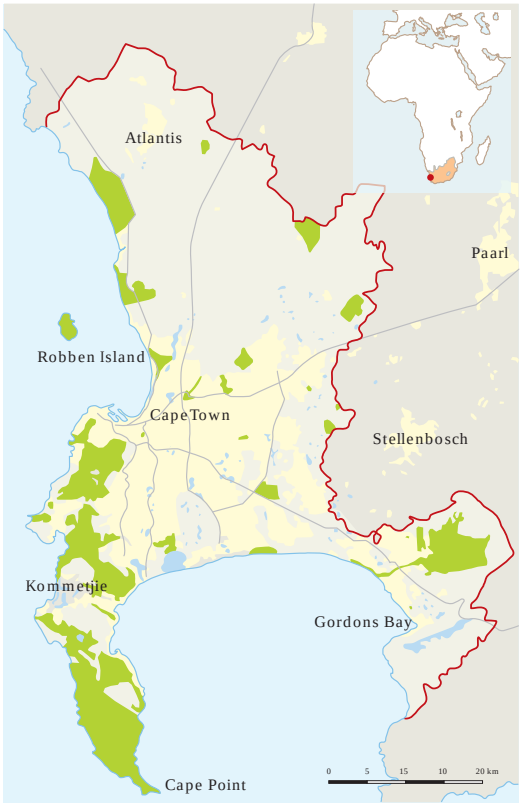
Ecologically, Cape Town is situated within the Cape Floral Kingdom (CFK), the smallest of the 6 Floral Kingdoms (covering only 0.04% of the earth), and the only one to be contained within a single country. The Cape Floral Kingdom is incredibly rich and diverse, with approximately 9 600 species, of which 70% are endemic, and 1406 are Red Data Book species. (Red Databook species : Species that are listed as Vulnerable, Endangered, or Rare). The CFK is listed as one of Conservation International's Global Hotspots of Biodiversity.

2. Regional Context : Cape Action for People and the Environment (CAPE)

Recognizing the global importance of the CFK, the Cape Action for People and Environment (C.A.P.E.) was initiated to develop a long-term strategy to conserve biodiversity in the terrestrial, marine and freshwater ecosystems of the Cape Floral Kingdom. C.A.P.E. has its goal that by the year 2020, the natural environmental of the Cape Floral Kingdom will be effectively conserved and restored wherever appropriate, and will deliver significant benefits to the people of the region in a way that is embraced by local communities, endorsed by government and recognized internationally.[2] The planning for the terrestrial component was undertaken by the Institute of Plant Conservation at the University of Cape Town (C.A.P.E. 2000) and consisted of a systematic series of steps in a planning protocol. The planning analysis gave rise to the Strategy, with priority being given to areas identified as having high irreplaceablity and extreme vulnerability.
The planning analysis highlighted that of all threatened plants in the CFK, almost a third occur within the City of Cape Town area.

3. Biodiversity in the City of Cape Town

It is Cape Town's unique location surrounded by ocean on two sides (figure 2) (one side being the cold Atlantic ocean, the other the warmer waters of False Bay), with mountains and lowlands and the varying underlying geology and soil, together with the Mediterranean climate and significant variation in rainfall within a short distance, that has contributed to the unique biodiversity found within the City limits.



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Four broadly defined vegetation communities occur within the city boundaries, namely:

- Sandplain Fynbos (of which less than 1% of its original extent remains on the Cape Flats[3]);
- Dune Thicket;
- West Coast Renosterveld (of which less than 3% of its original extent remains in the entire Cape Floral Kingdom[4]); and
- Mountain Fynbos

2

The first 3 broad vegetation communities occur predominantly on the Cape Flats - the lowlands areas, with the Mountain Fynbos largely restricted to the mountainous areas of the Peninsula and the Hottentots-Holland mountain chain, forming, in places, the eastern boundary of the City. The vast majority of this broad vegetation community enjoys protection by virtue of the mountainous terrain and inclusion in formal conservation areas, for example, the Cape Peninsula National Park, Helderberg Nature Reserve and Kogelberg Biosphere Reserve. It is the vegetation of the Cape Town Lowlands that is under increasing pressure and threat from impacts associated with urbanisation and resource exploitation. Table 1 below illustrates the species richness of these 2 distinct areas in the City.

Table 1: Example of floral diversity in Cape Town

Cape Town Lowlands	Mountain Fynbos - Peninsula Mountain Chain
1466 plant species	2285 plant species
76 endemic species	160 endemic species
131 Red Data Species	141 Red Data species

In addition to the extraordinary floral wealth, the City is also home to a number of endangered faunal species, including: 7 amphibian species, 10 avian species, 4 reptilian species, and 5 mammalian species.

Of significance is that Cape Town is regarded as one of 3 urban biodiversity hotspots in the World.

The City's incredible biodiversity, especially that of the Cape Town Lowlands, is however under great threat. These threats come primarily from landscape transformation resulting from agriculture and the demands of urbanisation, including housing, both upmarket and low-income housing, and resource exploitation, e.g. sand mining. The majority of impoverished people live on the Cape Flats, where the most vulnerable and endangered flora occurs. This is a legacy of apartheid planning, as the Cape Flats became the resettlement area for people living in areas regarded by the then Government, to be given over to the politically privileged racial groups. In creating the new 'townships', sand dunes were flattened, vegetation bulldozed and wetlands filled in – all significantly impacting on the biodiversity. This impact continues given the urbanisation trend, resulting in rural poor migrating to the city – the vast majority of whom settle on the Cape Flats. Priorities of the post-apartheid government include poverty alleviation and provision of basic services, including housing, to these marginalized communities. It is against these socio-economic realities that biodiversity conservation needs to be balanced.

Figure 3 illustrate some of the highly threatened Cape Town Lowlands plant species: Aristea luguens, Brunsvigia orientals, Disa lugens, Hessea cinnamomea (top-down).
The Erica verticillata is a plant species that was extinct in the wild from the 1940's, now reintroduced into a nature reserve.

4. Biodiversity Strategy – A Strategy of IMEP

In light of the threats posed to Cape Town's globally important biodiversity, and the challenge to protect it for future generations, the City has committed to the implementation of a Biodiversity Strategy, one of 6 priority strategies of the City's Integrated Metropolitan Environmental Policy (IMEP), which was adopted by Council on 31 October 2001. IMEP provides a policy and principle framework for sustainable development within the City. It is an integrative policy taking a broad approach to environment and comprises 15 sectoral themes

The vision of the Biodiversity Strategy is: To be a City that leads by example in the protection and enhancement of biodiversity. A City within which biodiversity plays an important role, where the rights of future generations to healthy complete and vibrant biodiversity is entrenched and to be a City that actively protects it biological wealth and prioritises long term responsibility over short term gains. [5]

The Biodiversity Strategy (The draft Biodiversity Strategy was circulated for public comment and has been reviewed and amended in light of comments received. It is planned to have the Biodiversity Strategy adopted by Council as a Strategic Programme in the 4th quarter of 2003). has Seven Strategic Objectives (see below), each with its own goal, principles and approaches identified, which together aim to protect and conserve the City's unique biodiversity – arguably its greatest asset. Common to all the strategic objectives is that of partnerships. The City advocates that protection of biodiversity is a shared responsibility, and not something it can achieve on its own. A number of partnerships have already been established, but more are sought.

Primary Biodiversity (Conservation Areas and Biodiversity Nodes)
Secondary Biodiversity (Conservation through Corridors, Links and Mixed Use Areas)
Conservation of Biodiversity in Freshwater and Aquatic Systems
Invasive Alien Species Management
Biodiversity Legislation and Enforcement
Biodiversity Monitoring and Information Management
Biodiversity Education and Awareness

5. Biodiversity Network

At the centre of the conservation of the City's unique biodiversity is the vision for a Biodiversity Network, which must conserve of a set of ecologically representative conservation areas connected through a network of corridors and nodes. It is the first attempt to proactively identify such a network, and integrate and streamline initiatives in the city of relevance to biodiversity. The aim of the Biodiversity Network in the City of Cape Town is to ensure long-term protection of pattern (i.e. biomes, habitat, vegetation types, plant communities, species and populations) and process (i.e. migration, pollination, dispersal) of biodiversity within the City.

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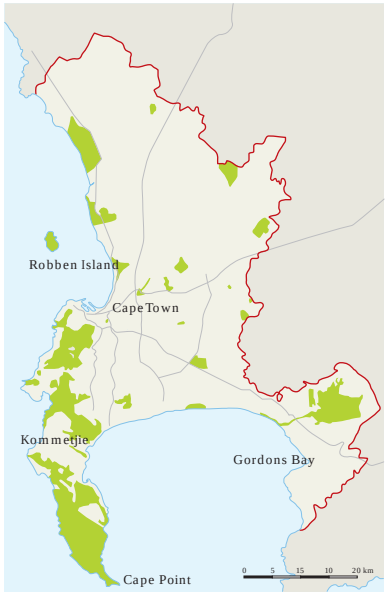

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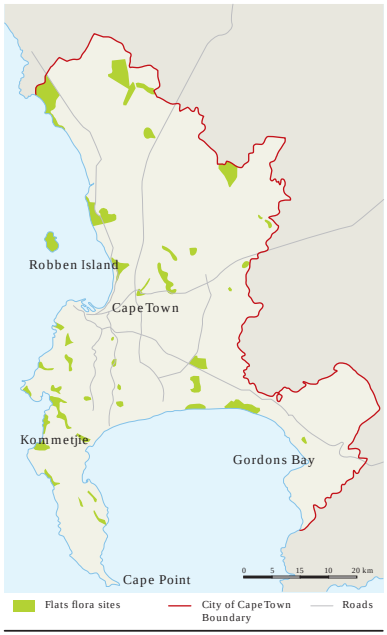

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A. Approach

The approach taken to identify a City-wide Biodiversity Network, has been to include the existing protected areas (figure 4), the 37 Cape Flats Flora Core Conservation sites. (The 37 Cape Flats Flora Core Conservation sites being the minimum set of sites identified that were required to conserve 97,5 % of the endemic Cape Flats Flora. (Cape Town Lowlands vegetation) [6]) (Figure 5), and using best available data to initiate a conservation planning exercise using a defensible and recognized modelling approach.

B. Scientific Methodology [7]

The methodology followed to scientifically identify the proposed Biodiversity Network was a follows:

- Review of conservation planning methods: which was used to inform the development of an appropriate methodology.

- Development and Review of a Draft Methodology : This was based on the 6-point plan of Margules & Pressey (2000)[8] for identifying conservation worthy areas through systematic conservation planning, and used C-Plan – the GIS based tool used in CAPE 2000 to identify areas to meet targets set. The draft methodology was presented at a stakeholder workshop for discussion and comment. Two independent specialists also reviewed the methodology.

- Data Selection : A list of information required for an ideal analysis was collated. Data availability was then assessed, and consideration given to issues such as sample evenness, scale and accuracy. Gaps were assessed as a measure of comprehensiveness. Vegetation type was selected as the surrogate element and Low's Distribution and Remnant maps (1:10 000)[9] were adapted for use in the study. The analysis was thus undertaken of remnant areas for 15 vegetation types. These were based on the 4 broad vegetation communities in the city and their association with geology/ soil and supplemented by rainfall, for example West Coast Renosterveld on Granite, Mountain Fynbos on Shale > 800mm per annum. Floral species were used as a secondary dataset, as a check for the results.

- Compilation of a Candidate Remnant Areas Dataset: This was achieved by preparing a map of transformed land, and removing transformed areas from the base map of remnant vegetation prepared from Low's data. The resultant map was verified by on-the-ground managers and the project team. The remnant map was compared with 1998 aerial photography as a means of verification. Existing protected areas, Cape Flats Core Flora Conservation sites and other significant areas, as determined by the Environmental Significance Mapping[10] were added to the result map to establish the candidate remnant areas data set.

- Determination of Targets for Conservation for both Vegetation Type and Plant Species : Targets and criteria were set to ensure conservation of pattern (e.g. vegetation types) and process (e.g. hydrological and pediological) within the Biodiversity Network for Cape Town. Targets were calculated based on the rarity and degree of transformation of vegetation types. 3 rarity classes were identified using the historical extent of each vegetation type: those of the rarest class were assigned a 20% base target; intermediate class communities were assigned a 15% base target; and the commonest, a 10% base target. These values were used to determine the final targets by altering the base target by the degree of vegetation transformation (t). (t = 2 - current extent / historical extent). The final target was calculated using the Base Target multiplied by the degree of transformation. (Final target = base target*t)

  Targets set for vegetation type were as follows: 10% IUCN target; a rarity and transformation target ranging from 10 – 40 %; and a 60% target reflecting the impact of habitat fragmentation [11,12]. Where the graduated target for a vegetation type was greater than the area remaining in extant remnants the target has been set for 100% of the remaining area.

Species targets were based on the number of locations as described for each species using the Protea Atlas Project[13] and Sites and Species[14] databases. For all species with 5 or less known locations, targets were set at 100% of known locations. Whilst for species with 6 or more known locations, targets were calculated as 80% of known locations.

- Conservation Planning Analysis and Ground-truthing : The achievable targets were calculated and the extent to which they were met by existing reserves determined. The irreplaceability (the value of an area as a measure of its contribution to attaining conservation targets) of non-reserve remnant areas was determined. Ranked biological planning criteria of (1) irreplaceability, (2) largest areas chosen first, (3) percentage contribution of an area to meet outstanding targets, and (4) areas with greatest vegetation type diversity, were applied to select additional areas to achieve targets. (2) – (4) were only used in the algorithm if values relating to (1) irreplaceability, were tied. The contribution of areas selected for vegetation type to achieve floral species targets were assessed and additional areas selected as required, by application of the criteria (1) irreplaceability, (2) species richness, and (3) largest areas first.

  Two rounds of ground-truthing of the candidate sites were undertaken, and four iterations of the conservation planning analysis were run. The results were also reviewed by Specialists and the analysis re-run.

- Friction Analysis: Given that C-Plan does not address process, a Friction Analysis was undertaken. A friction model was developed of all identified and selected sites in relation to other features to be conserved, for example rivers and other land-use patterns (e.g. roads, agriculture, built up areas, etc). Each land-use was examined with respect to its biodiversity compatibility and allocated a friction value relative to that. Protected and selected areas were ascribed a base value of 1, with friction values increasing with decreasing compatibility for biodiversity conservation, for example: major roads and freeways were given a friction value of 30, high intensity agriculture - a friction value of 120, and industrial settlements a value of 240.

  From the friction surface a cost surface was generated, [15] and pathways, which are demarcated by a line, were defined from a start point to target areas based on the minimum amount of friction that must be accumulated. Bi-directional optimal pathways were thus generated defining the line of least resistance between a target line and the starting point. Superimposition of these pathways resulted in generation of a network, which best-described suitable ecological gradients that were compatible with maintaining biodiversity. Where pathways cross they form nodes and these are regarded as needing highest priority for conservation. The nodes were weighted by the number of pathway intersections. By using buffers around the corridors and nodes a planning framework was established for identifying and prioritising the final selection of remnant areas for the Biodiversity Network. The corridors and nodes identified provide a basic framework from which final corridors will emerge, based on the areas identified and on-the-ground verification and knowledge.

C. Results

The proposed Biodiversity Network for the City of Cape Town, resulting from this planning study, is illustrated as Figures 6 & 7.

The study identified that in order to meet all the graduated targets for vegetation type, 219 remnant areas were needed in addition to existing protected areas. Of these, 67% of the areas are greater than 50 ha in size and 44% less than 10ha in size. A further 42 areas were identified based on species targets, with 22% of these less than 50ha in size, and 29% less than 10ha. The total network of 261 remnant areas was thus selected. The 261 remnants areas cover an area of 32 262ha, which is 89% by area of non-conserved natural remnants in Cape Town, and 16% of remaining vacant land in the City. Protected areas in the City cover 54 300ha The study has thus indicated that a total of 86 562ha, including existing protected areas, is regarded as the minimum area required to protect the City's biodiversity. 19 corridors and 18 nodes were identified, with 95 remnants being interested by corridors and 22 remnants by nodes. Nodal intersections amounted to 8 184ha.

6

7

6. Vision for a Sustainable Biodiversity Network : The Way Ahead.

The proposed Biodiversity Network illustrated in Figure 4 is regarded as a starting point. As the stud y was largely a desktop, computer-based modelling analysis, with limited ground-truthing, it requires further refinement prior to adoption as the Biodiversity Network for the City of Cape Town. Critically, it needs to be integrated with on-the-ground realities (for example, demand for housing land; resource constraints for conservation management) and with existing initiatives and programmes, for example the Land-Use Management System, Housing Land Plan and the lntegrated Development Plan, amongst others. A socio-economic analysis and stakeholder involvement, resulting in prioritisation of areas for management and land acquisition, are also required.

Whilst work is being undertaken to progress the Biodiversity Network plan to finalisation and adoption by the City, which is aimed at being achieved by June 2004, a process of 'Red Flagging' is underway as a measure to protect areas identified scientifically as important for biodiversity conservation, prior to these receiving formal Council recognition. The 'Red Flagging' aims to put in place a process whereby an official is alerted to the fact when land which may be the subject of a land-use application or project proposal, has been identified as part of the Network. This in turn will allow for assessment of the application or proposal, in terms of its intended use, with respect to suitability and compatibility with objectivities of biodiversity conservation, leading to potential discussion and negotiation regarding the proposal in order that biodiversity loss can be minimised.

Given economic and practical realities, the Biodiversity Network is intended to provide for a number of conservation management models for land identified. A study that investigated a range of options for conservation models has been undertaken. These models will be applied, as appropriate to the various Network sites. The most critical and important parcels of land for biodiversity conservation, to be identified through a prioritisation process which is to take into consideration the regional context of C.A.P.E, are intended to be afforded the highest level of protection and managed as nature reserves and protected areas. The majority of the identified areas are envisaged to become mixed-use areas that cater mutually for human and ecological needs and allow for a mixture of urban use and recreation whilst maintaining biodiversity integrity within other uses. Both the priority and the mixed-use areas will be linked by corridors, thereby creating biological opportunity - a vitally important component in the Network given the fragmented urban landscape, which has resulted in relatively isolated remnant vegetation sites. Road verges, river corridors, and infrastructure servitudes are some of the examples of areas to be managed as corridors. Ultimately, it is intended to confer appropriate land-use zoning status on all areas identified within the Biodiversity Network.

Given the context of Cape Town, with its pressing socio-economic needs, it is important that there is a clear demonstration of the socio-economic benefit of protecting biodiversity, and the establishment of a Biodiversity Network. A number of on-the-ground projects are already exploring these aspects, for example, the Blaauwberg Conservation Area, the False Bay Ecology Park and Cape Flats Nature. These projects also reflect, on a site-specific basis, a microcosm of the elements of the Biodiversity Strategy, and the challenges and threats faced by the Biodiversity Network.

A project, proposed to implement the southern component of the Biodiversity Network along the False Bay coastline, an area of high biodiversity importance but also an area of extreme poverty and need, that will give focus to socio-economic issues in the context of biodiversity conservation, is underway. The project will also give effect to regional biodiversity targets through connecting the Cape Peninsula National Park with the Kogelberg Biosphere Reserve. It is intended that this project will be a multi-institutional (comprising the City, the Provincial Administration of the Western Cape, the Western Cape Nature Conservation Board and the South African National Parks), multi-disciplinary and multi-phased initiative, which will identify appropriate conservation models for various areas within the study area, delineate corridors and links, and improve local environments by realising economic and social benefits. The final phase of the project will be to collate a Biodiversity and Development Plan for False Bay, which is planned to be implemented over a 5-year period. It is intended that the project will establish a model for sustainable development, by optimising the benefits the unique natural resources present to the City and the region, integrating management of these resources

across a number of organisations, establishing partnerships, and optimising social and economic opportunities, whilst protecting and enhancing biodiversity, landscapes and natural processes. It is hoped that it will clearly demonstrate the integration of the needs of development, poverty alleviation and conservation. Lessons learnt from this project will be extended to other areas in the Network.

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Acknowledgments:

Numerous people from a multitude of organisations, including government, parastatal, non-governmental and civil society, have contributed to various processes and initiatives that have informed and assisted with the development of the City of Cape Town's Biodiversity Strategy and proposed Biodiversity Network. They are too numerous to mention, but are gratefully acknowledged for their contribution to protection of the City's biodiversity assets.
Various consultants have provided technical expertise which resulted in the proposed Biodiversity Network: Richard Knight, Botany Department – University of the Western Cape; Richard Cowling, University of Port Elizabeth; Common Ground Consulting; Terre Mare Environmental Data Systems; Geographical Information Systems (GIMS)
Photograph and Graphics Acknowledgments: City of Cape Town; Dalton Gibbs; Anton Pauw

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Regionalpark Frankfurt Rhein-Main (Germany): Achievements and Setbacks in Regional Co-operation

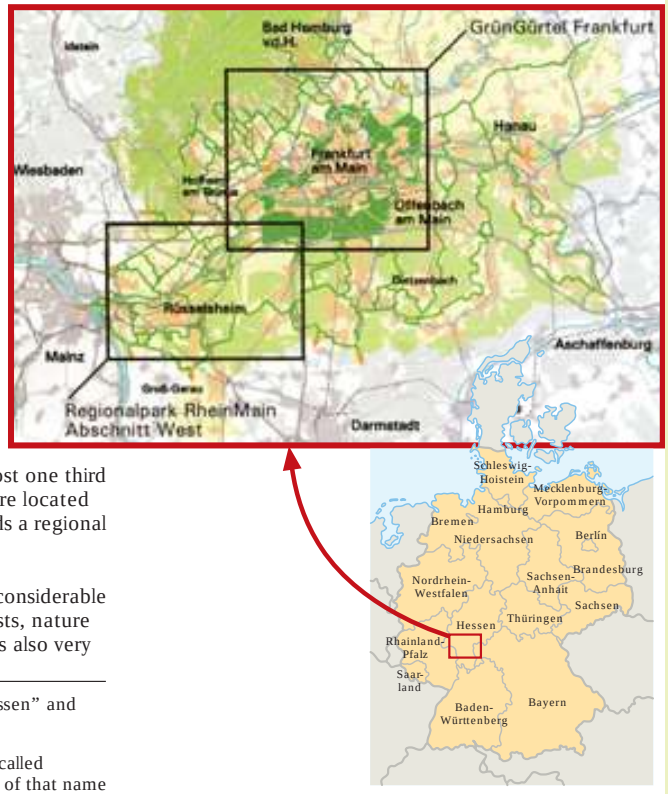
Our region is among of the prosperous ones in Europe. With the core city of Frankfurt am Main, site of a unique skyline and seat of the European Central Bank, it is a dynamic region of about 5 million inhabitants, centrally located in Germany as well as in Europe (figure 1). It hosts one of the busiest European airports. But the region is more than Frankfurt alone: With the two Land[1] capital cities Wiesbaden and Mainz, the science city of Darmstadt, historic Aschaffenburg as well as a range of medium size towns and cities it is a truly polycentric region. Under the name of „Darmstadt“[2] (somewhat misleading) this region scores high in Eurostat regional statistics. The statutory entity nearest to the functional Region Frankfurt Rhein-Main is the Planungsverband Ballungsraum Frankfurt/Rhein-Main, designed to be responsible for planning in the Frankfurt Rhein-Main conurbation.

Region Frankfurt Rhein-Main: Planungsverband´s area

	Num. of Towns	Surface	Inhabitants	Jobs
Region	75	2.459 km²	2.151.000	955.500
Frankfurt	1	248 km²	643.800	457.400
Frankfurt´s share	1,3%	10,1%	29,9%	47,8%

This simple table reduces regional statistics to its roots: You see that Frankfurt is just one of our member towns covering a mere 10 % of our region. There are, however, almost one third of the regional population living in Frankfurt, and nearly half of the Jobs[3] in the region are located there, too. Just imagine the streams of commuters this implies. In fact, such a region needs a regional authority.

Being polycentric (figure 2) means that there is, rather surprisingly from the outside view, considerable open space between the settlement areas. This open space is including rather large forests, nature sites of high importance and it is as well the place for busy agriculture. The open space is also very



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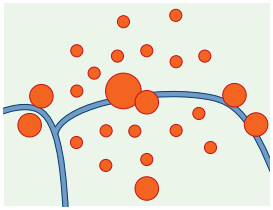
[1] “Land”: German federal state – Wiesbaden and Mainz are in Hesse and Rhineland-Palatinate (“Hessen” and “Rheinland-Pfalz”), Aschaffenburg in Bavaria (“Bayern”)

[2] What EUROSTAT are referring to in their NUTS system is the “Regierungsbezirk Südhessen”, often called “Regierungsbezirk Darmstadt”, as the administration, the Regierungspräsidium, is located in the city of that name

[3] For technical reasons these are jobs of those who pay a contribution to social security



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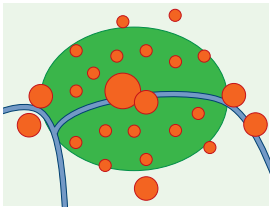

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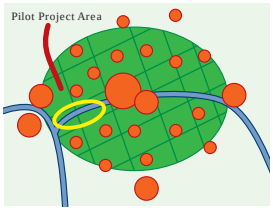

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much in use by the citizens for walking, cycling and the like, as we do not have to look for green islands but can make use of a coherent system of open space. But, of course, in a metropolitan area, open space is the site of infrastructure (motorways and railway lines have to be somewhere), and is under pressure from demand for space for building.

This demand for open space is well controlled by legal instruments. Most of the open space is protected as ”Regionaler Grünzug“ (”Green Belt“) by the statutory Regional Plan (figure 3). The system is working well, obviously. On the other hand, this instrument has some weakness as it has to be flexible (the outline of a ”Regionaler Grünzug“ can be changed) and, what is more, it is rather from a planner‘s world: This category does not appeal to the public, there is no such thing as the charm of a ”Regionaler Grünzug.“

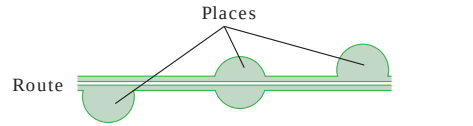
In recent years among planners the awareness rose that planning is more than prohibiting unwanted developments. The new element is to encourage development, development of, in this case, open space functions.

In the Frankfurt Rhein-Main region this idea took shape as the Regionalpark Rhein-Main, a linear park as the backbone of the ”Regionale Grünzüge“ (figure 4). One of its main aims is to connect open spaces, for the direct benefit of citizens and nature, and, on a more abstract level, to add to the region‘s attractiveness: Companies demand an interesting environment as an additional locational factor.

The basic idea is quite simple: We will build a network of Regionalpark routes, through open space and thus around the towns and cities. Wherever possible existing structures will be used: This applies to paths as well as attractions, for example: Historic gardens, monuments (including industrial heritage), nature reserves, wayside inns and so on.

The Regionalpark is a network of routes and places. Routes consist of a path 2.5 to 3 metres wide, typically with a grit surface, enclosed by rims of 10 metres each, planted with trees, flowers, bushes and the like, depending on local circumstances. Within distances of, say, 500 metres from each other, the Regionalpark route will be complemented by Regionalpark places (figures 5, 7, 8, 9). This can be anything that adds to a park: A formal garden, a pond, a historic site or a new installation, a watchtower or a nature reserve.

Routes and places



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Through this uniform layout the park can be recognised easily: No need to carry a map on your visit. And, as the leading principle is to integrate local identity, it will by no means be monotonous.

This is not a small project. When finished, all routes will add to a total of some 300 km or more. Of course, this is work for decades. Although one might think the whole is utopian, work has started in 1995, and the first part (the Pilot Project) has almost been completed (figure 6).

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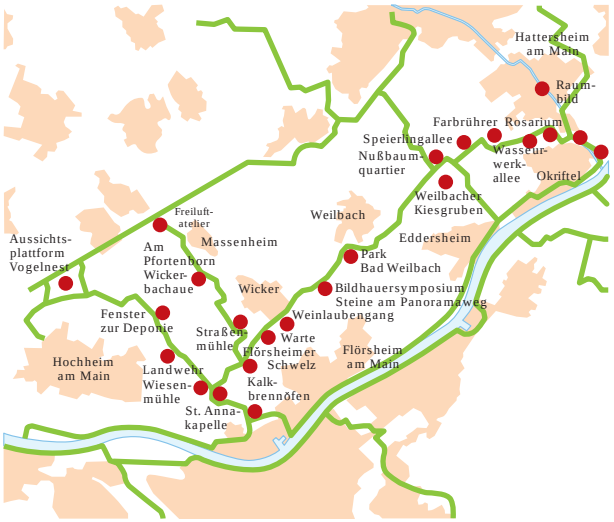

So far, this could be sold as a success story: From idea to tangible results we proceeded rather quickly, and the project is now widely accepted and appreciated. Of course we encountered lots of challenges: Opposition by farmers and nature conservation organisations, long negotiations with land owners, the search for funds, unexpected delays, tedious procedures (building permits…) and simple not-in-my-backyard attitudes – in short, not much difference to other planning projects. These adversities have been overcome thanks to the commitment and enthusiasm of a few colleagues.
The whole project is based on lean management structures. Where appropriate, societies have been founded for the implementation of the Regionalpark with the Planungsverband and the various local communities as sharing owners, and virtually without own personnel: With one or two exceptions work is carried out by Planungsverband staff and staff of the

member communities. In other cases projects are implemented simply on a contract basis between the town where the project is located and the Planungsverband. The whole project is rooted regionally: The Planungsverband provides for what is called a corporate identity in classic marketing. For the customer this means that information material (especially route maps) is provided. Internally, in negotiations with local partners, this means that the Planungsverband is guiding the evolution of the Regionalpark – it is the balance between local identities we want to enhance and uniform layout of the park as a whole the Planungsverband stands for. For example, it is again and again important to make clear that the Regionalpark is an instrument for open space: Upgrading a town hall forecourt would probably not be a Regionalpark project… The Planungsverband also has a role in part funding the park and in making funds available, including eco-fees and money from sponsors. Being responsible for planning on a regional scale, including landscape planning, the Planungsverband stands for a certain authority and for an undisputed know-how. Finally, the whole process – from idea to implementation – is in one hand.

Unfortunately these achievements are at risk: In April 2001 a reform of the regional organisation took place - Planungsverband Ballungsraum Frankfurt/Rhein-Main has been founded, as successor to the Umlandverband Frankfurt. For the convenience of the readers it has been avoided so far to make the distinction between the two, but well: Most of what has been achieved are Umlandverband products, and between April 2001 and December 2002, due to transition regulations, Planungsverband was able to execute the powers the Umlandverband had. Now to describe the differences between Umlandverband and Planungsverband and the motivation behind the reform in detail would fill various pages. Instead, a few catchwords: The Umlandverband's area was smaller, and it had less inhabitants, but the Umlandverband had more competences. The Umlandverband's key instrument was the Flächennutzungsplan (the Land Use Plan, one plan for the whole region), now the Planungsverband is supposed to set up a Regionaler Flächennutzungsplan, a Regional Land Use Plan, what actually means combining two levels of planning (Regional Planning and Land Use Planning) and demands co-operation between two authorities (Planungsverband and Regierungspräsidium). This construction leaves little room to implement projects like the Regionalpark. This is actually following the classic German approach to planning: The administration makes a plan, and private landowners are supposed to implement it. And yet there might be a loophole: The Planungsverband might, to put it simply, carry out certain regional tasks, on behalf of the region – provided the region decides it.

For the moment the following solution is evolving: As Planungsverband we are partners in two Interreg-projects, SAUL and SOS ("Sustainable and Accessible Urban Landscapes" and "Sustainable Open Space"). The background of both projects is the Regionalpark, and with these projects the region can expect 2.33 M¤ subsidies from the EU. Although both projects are quite different in detail (different partner regions from different countries, for example) they are so closely related that I rather describe what they have in common: They are double-faced, in a way – one part are a set of regional (or even local) investments, the other part is the transnational exchange. Of course it is the investments that attract local and regional politicians, and probably it is just that what influenced their decision to let us go ahead with it. As far as the transnational exchange is concerned, this is what makes these projects attractive for "Europe" (and what eventually made the authorities approve the applications). But in fact both aspects of the projects are linked so closely that regional investments and transnational exchange cannot be separated. To conclude: Even if the responsibility of local implementation were passed on to local or sub-regional organisations the Planungsverband would still have a say in it, as long as the Interreg projects continue.

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[4] A Regierungsbezirk might be described as the old fashioned version of a province, headed by a governor representing the Prime Minister of the Land.

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He has worked at the Institute of Town Planning, Technical University of Braunschweig (1972), the Institute of Town Planning and Regional Planning, Technical University of Berlin (1973-1978), l' Institut National des Études et des Recherches du Bâtiment, Alger (1979-1982). He is consultant and lecturer for different german institutions
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A Planning System of Open Spaces.
The Berlin-Brandenburg Common Regional Plan (Germany)

INTRODUCTION
German Planning System and How it is Shaped in Berlin-Brandenburg

The Metropolitan Region of Berlin-Brandenburg consists of the two German federal states of Berlin and of Brandenburg and is characterized either as compact urban area of Berlin or the thinly populated state of Brandenburg – surrounding the Berlin metropolis lying nearly in its middle.

The city-state of Berlin with its 12 boroughs on a total surface of 891 km2 and the wide spread state of Brandenburg with 14 districts, 4 district - free cities and nearly 1,5oo municipalities on a surface of 29,476 km2 form the category "Whole Area" with 30,358 km^2 (figure 1).

1

Following the spatial structure two main planning areas are distincted: the "Outer Development Area" (24,990 km2) and the "Close Sphere of Mutual Influence Brandenburg-Berlin" (5,368 km2 = the city of Berlin and its surrounding municipalities with 4. 477 km2 as the Brandenburg share).

The spatial structure is characterized by the following facts: Extremely spatial contrasts between the compact urban area and thinly populated peripheral areas; the increase of suburbanisation and urban sprawl after 1989 (fall of the Berlin wall); the reviving of infrastructure connections in the formerly disrupted space; a region of special quality with attractive open landscapes as part of the lowlands of Northern Germany. The glacially formed landscape consists of medial and terminal moraines and glacial valleys ("Urstromtaler") and is covered by vast agriculture and forest sites. One of the remarkable features of this landscape is its rich system of rivers and thousands of lakes (figure 2).

Furthermore, the spatial structure is characterized by very disparate figures of population density: The Metropolitan Area (Whole Area with ca. 6 million inhabitants) shows a varying scale of density. As to Berlin: the inner city 12,000 inh./km2, the suburbs about 1,500 down to 800 inh./km2 near the outer border; concerning Brandenburg: ca. 180 inh./km2 in the peri-urban space down to ca. 40 or less inh./km2 in the periphery (Outer Development Area).

In the case of Berlin-Brandenburg a joined spatial planning system shaped in a very special manner was established by a state treaty. In general, the German planning system corresponds with administration levels which are the following: 1. the federal state with the Minister's Conference of Regional Policy (federation and its member states); 2. the member states with a real competence of regional policy establishing state development plans; 3. (sub-)regional planning in counties or (sub-)regions and 4. - last, but not least – the town planning level, based on an own federal legal

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basis. The two main levels of the mentioned superlocal and local planning systems are connected by regulations, which under special conditions allow to prescribe rules for the extension or not-extension of the built up areas of the municipalities: this is the main question in protecting or not open space in growing settlement agglomerations.

Following these planning principles, the administration of Berlin had to install two levels in its planning system: the local city development planning and the superlocal state development planning in order to unify the latter with the system of the surrounding state of Brandenburg. Thus there was established a joint administration: the Joint State Planning Department as part of the Ministry of Agriculture, Environment Protection and Regional Policy of Brandenburg on the one hand and the Senate Administration of City Development of Berlin on the other.

In Germany two kinds of planning in accordance to the space are distinguished: comprehensive planning, integrating at least some main subjects (settlement structure, meaning central towns, built up areas etc.; traffic infrastructure, meaning railways, roads, waterways; open space structure, using different instruments) and some sorts of special sector planning. In our case it is landscape planning as part of sector planning which includes "Nature Protection Areas" („NSG", with 338 NSG = 152,336 ha = 5 % of the surface of Brandenburg), "Landscape Protection Preas" („LSG", with 112 LSG = 951,337 ha = 32 % of Brandenburg) and a group of "Large Protection Areas" („GSG" , i.e. combination of "NSG" and "LSG" with 15 GSG = 9,705 km2 30 % of Brandenburg), with National Parks, Biosphere Reservations and Nature Parks.

Concerning the regulation of land use the leading factor is the comprehensive planning as main instrument of regional policy. This integrates the results of different sector planning systems (others are water protection, traffic planning etc.) and defines an aggregated system of regulations of land use. The instruments of regional policy of the joint state development planning of Berlin and Brandenburg work under the regulations of the Federal Regional Policy Law ("Raumordnungsgesetz ROG") and the State Treaty of Berlin-Brandenburg concerning Common Spatial Planning. These instruments are the

State Development Program ("Landesentwicklungsplan – LEPro"),
State Development Plan concerning the Sphere of Mutual Influence ("Landesentwicklungsplan engerer Verflechtungsraum Brandenburg-Berlin - LEP eV'), both from 1998
and the
State Development Plan - Regulations for the Outer Development Area ("Landesentwicklungsplan Gesamtraum, Festlegungen fur den aul eren Entwicklungsraum „LEP GR"), which will come into action in 2004.

OPEN SPACE PLANNING
Obligating Regional Planning Based on Results of Landscape Planning are Undispensable

The comprehensive (i.e. integrated) superlocal planning instruments define – using the results of sector planning (in our case especially from the sector of nature protection and landscape planning) – a scale of requirements and regulations for the topic of open space planning and development.
The following five open space planning instruments are to be coordinated (cf. diagram in the appendix):

1. Green Linkages of Major Importance (source: LEP eV)
2. Regional Parks (source: LEP eV)
3. Open Space with Special Need of Protection (source: LEP eV),
4. Open Space Network with Ecological Impact (source: LEP GR),
5. Large Protection Areas (source: nature protection and landscape planning)

These instruments give an idea of what is meant by special effort: forming a network of spaces for the development of nature. From now on it will overlap the traditional man-made network consisting of settlement places and traffic lines as connection elements in this human network. Both networks are to be brought into co-existence mitigating the unavoidable contradictions between them (mainly

crossings etc.).

First of all the main principle of the "LEPro" is to be regarded. This joint State Development Program founded a mutual basic agreement for the entire spatial development of Berlin-Brandenburg with core elements for sustainable development in the metropolitan region. It follows the principles of:

1. decentralized concentration for settlement development,
2. the protection of local green areas and the development of near-settlement open spaces,
3. the priority of inner to outer development of built up areas in all towns and communities.

The mentioned five main instruments of open space planning are working together, each with its own possibilities supporting the others to get a network for the protection of nature as follows:

1. Green Linkages of Major Importance –
linear green linkage elements as support for habitat network, for walking and biking trails,

a) in the city of Berlin as linkages between large open spaces (Open Space with Special Need of Protection),
b) in the surroundings of Berlin: linkages to Regional Parks (figure 3)

2. Regional Parks -
creation of a belt of eight parks around Berlin (figure 4) to protect the open landscape between the radial rail connections with a total area of about 2,000 km2; organisation and management: n-formal "Community Work Groups" consisting of the admininistrations of Berlin's outer boroughs, the adjacent municipalities, nature conservation groups and private initiatives; intermunicipal cooperation on informal levels combined with local business and pressure groups;

Time table: 1995 concept development in the framework of the LEP eV (comprehensive State Development Plan, 1996 initiation of the Community Work Groups, since 1997 first actions started running, e.g. construction of cycle track networks; financing and realisation: The Working Groups

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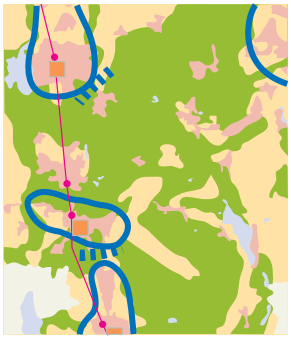

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are supported by the Joint Planning Department; single actions are carried out by grants from public labour funding programmes.

3. Open Space with Special Need of Protection -
Non-construction area (taboo) to guarantee nature values, habitat network, climate protection in the Close Sphere of Mutual Influence (i.e. the agglomeration under settlement pressure). In the city of Berlin: large inner urban green spaces linked by Green Linkages of Major Importance (figure 5)(cf. No. 1, in the surroundings of Berlin part of the Open Space Network with Ecological Impact, cf. No. 4) with a higher degree of protection (taboo against buildings as special need in the peri-urban/agglomeration area).

4. Open Space Network with Ecological Impact - (figure 6)
Methodical advancement of No. 3, adapted to the needs of the Outer Development Area with:

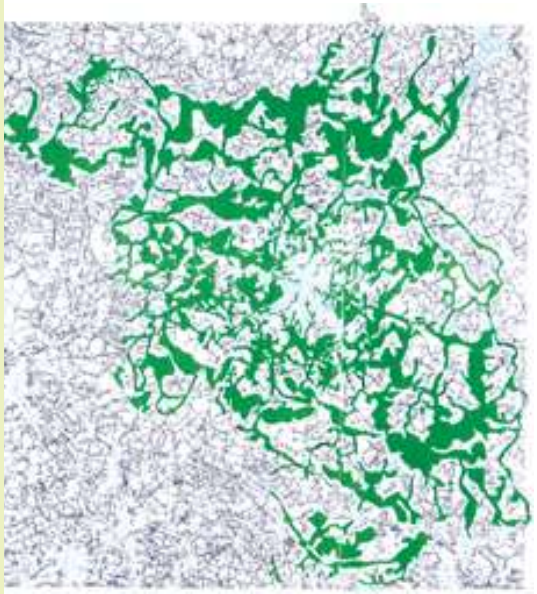
Components I: Nature Protection Areas ("NSG") > 5 ha; Special Protection Areas (SPA, cf. EU-Bird-Protection-Guide-line); Flora Fauna Habitat (FFH).

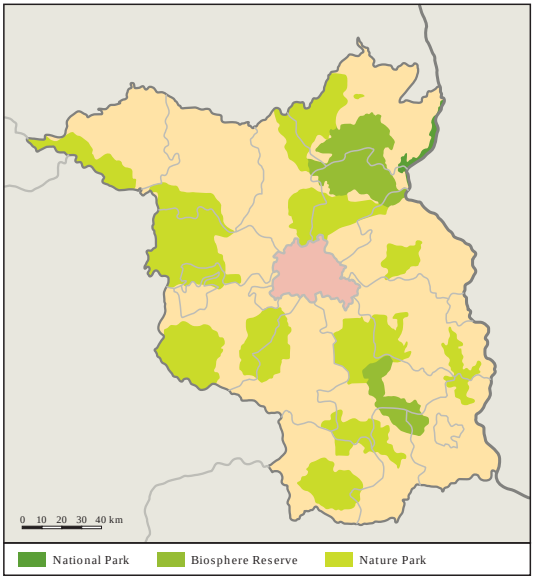
Components II:

a) in the Outer Development Area: nature protection core areas from Landscape Program of Brandenburg,
b) in the Close Sphere of Mutual Influence - here named Open Space with Special Need of Protection (higher degree of protection with taboo against buildings),

Components III:
providing linkages between components I and II plus main leisure areas and linkages of the hydrographic protection system, typical landscape structure and natural regions.

As result of the components I, II and III of "Natura-2000-Areas" (cf. Art.10 FFH-Guide line), overlapping and connecting these different values, an over all connection or network is generated producing open space priority areas for habitats – thus supporting the EU-demand of a network of biotopes.





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5. Large Protection Areas - (figure 7)
consisting of Nature Protection Areas, Landscape Protection Areas, National Parks, Biosphere Reservations and Nature Parks. Some data: 15 Large Protection Areas (created by the Brandenburg government) covering 9,705 km2 = ca. 30 % of the total surface of this state.

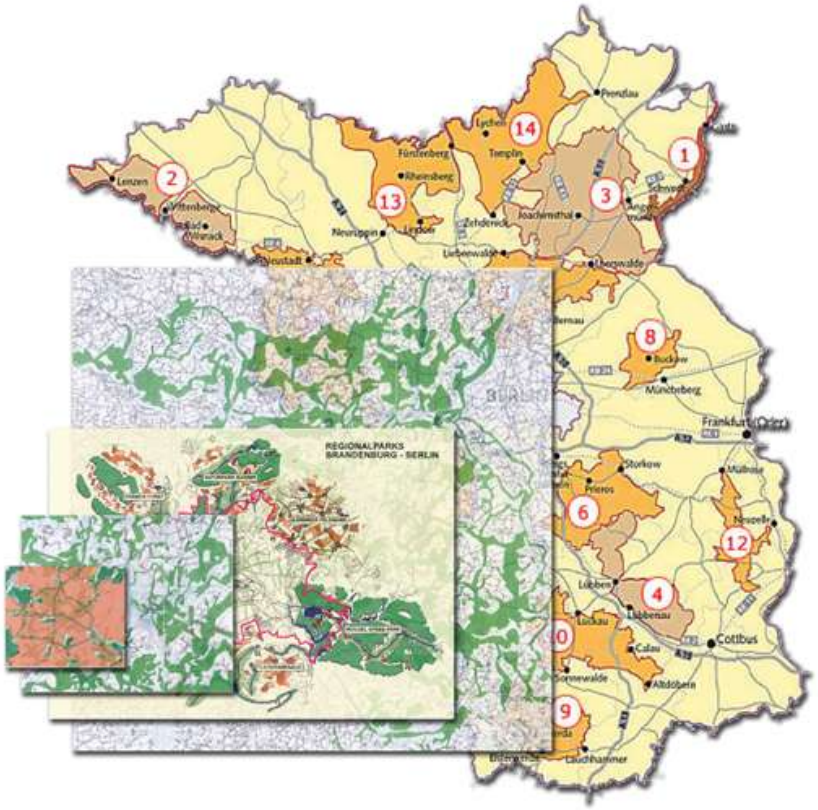
CONCLUSIONS
Changing the Model of Planning Philosophy – New Guidelines

The following principles direct the planning process:

1. Sustainibility
as main goal of the legal German federal framework for regional policy ("ROG") means a very well balanced triade of economic growth concerning urban development, infrastructure and spatial economics, social justice by participation, development of human population as a source of community life and environmental protection regarding values like protection of nature, climate, soil etc.

2. Obligating regulations – formal legal based instruments
in metropolitan areas are indispensable, for meeting the suburbanisation or settlement pressure is a need. Although the European populations will decrease, regulations of urbanisation are necessary as long as life standard rises (e.g. increase of living room, working and traffic space per capita). Using the legally based instruments of comprehensive/regional planning, the spatial development must be influenced. Therefore the main goals in the Berlin-Brandenburg area are: allocation of settlement areas at radial traffic lines, concentration, density and mixture of uses in urban areas, protection of open space as much as possible, prevention of urban sprawl.

3. Infomal actions on local level – public consense based cooperation
are used complementing the formal instruments. Four municipal neighbourhood forums round the city of Berlin discuss and organize on a local level conceptions of planning and motions to fix the town's edge („Stadtkante")in the surroundings of Berlin: precising the structure of relations between settlement and landscape, establishing principles of town planning and landscape design, bargaining land use principles, infrastructure needs for villages and agriculture, development of leisure areas.



8

4. Small financial support for Regional Parks – subsidiary development is necessary
in Berlin-Brandenburg is much less money available than the funds spent in other regions of more prosperity (Emscher Landscape Park: started with 150 mio DEM, until now at least ca. 250 mio Euro are spent; Green Blue Meander in the Netherlands: ca. 200 mio Euro – cf. concerning-contributions on the Symposium in Barcelona, March 2003), so that self-help actions are undispensable. From 1996 until 2000 for the project Regional Parks in Berlin-Brandenburg there were invested not more than about 5 mio Euro, mostly for provision of work measures.

5.Network for the protection of nature – an important result (figure 8)
combining different instruments coming either from the sector planning or being conceived by the comprehensive regional planning (with the effect of obligating regulations of land use) and meeting the human network of rails, roads and settlements a new planning model has been startet with first

steps towards an open space network for nature – consisting of five main open space planning instruments (cf. the matrix and explanations in the appendix), working together and being equally necessary for the survival of nature and of human beings as a part of nature.

ANNEX
Explanations to the Matrix of Instruments

1. Instruments of regional policy Berlin-Brandenburg
Under the regulations of the Federal Regional Policy Law (Raumordnungsgesetz des Bundes ROG) from 1998, Treaty of the States of Berlin-Brandenburg concerning common spatial planning (Landesplanungsvertrag Ober gemeinsame Landesplanung) from 1995
LEPro = State Development Program (Landesentwicklungsprogramm) from 1998,
LEP eV = State Development Plan for the Close Sphere of Mutual Influence (Landesentwicklungsplan fur den engeren Verflechtungsraum Brandenburg-Berlin) from 1998
LEP GR = State Development Plan for the Whole Area Regulations for the Outer Development Area / Landesentwicklungsplan fur den Gesamtraum Festlegungen fur den aul3eren Entwicklungsraum) comes into action 2004.

2. Instruments of the nature protection
Under the regulations of the
- Federal Nature Protection Law (Naturschutzgesetz des Bundes)
- Nature Protection Laws of Berlin and Brandenburg (Naturschutzgesetze von Berlin and Brandenburg) Nature Protection Area (Naturschutzgebiet NSG) established by statutory order (Fest legung durch Rechtsverordnung RVO)
- Landscape Protection Area (Landschaftsschutzgebiet LSG) - established by statutory order (Fest legung durch Rechtsverordnung RVO)
- Large Protection Areas (Grof3schutzgebiete)
- National Park (Nationalpark) - declaration of the Minister
- Biosphere Reservation (Biospharenreservat)- declaration of the Minister
- Nature Park (Naturpark) - declaration of the Minister
- EU-Guidelines (EU-Richtlinien)
- Natura 2000 Berlin-Brandenburg, area containing
- European Birds Protection Area (Europaische Vogelschutzgebiete) EU-Birds Protection Guideline (79/409/EWG)
- potential Flora-Fauna-Habitat Area (Potenzielle FFH-Gebiete) - FFH-Guideline (92/43/EWG) the latter have been announced to the European Commission. This announcement followed government decisions of the states of Berlin and Brandenburg.

3. Nomenclature of areas (and German abbr)
Gebietsbezeichnungen (und Abk.)

Whole Area (Gesamtraum GR)	30,358 km^2
Brandenburg (BB)	29,476 km^2
Berlin (B)	891 km^2
Outer Development Area (äusserer Entwicklungsraum äER)	24,990 km^2
Close Sphere of Mutual Influence (engerer Verflechtungsraum eV)	5,368 km^2
Close Sphere of Mutual Influence (Engerer Verflechtungsraum eV)	5,368 km^2
Berlin (B)	891 km^2
Brandenburg's share	4.477 km^2

Denhin, Pierre

Journalist from 1972 to 1982, then communications manager for the Conseil général du Nord from 1982 to 1992, initially branch manager and subsequently director of l'Agence de Développement et d'Urbanisme de Lille Métropole; from 1992 to 2002, Director-General of the mixed administrative body called l'Espace Naturel Métropolitain; since October 2002. Honorary Chairman of the Syndicat national des directeurs de parcs zoologiques français, [French National Zoological Gardens' Association], founder member of Journalistes pour la Nature et l'Environnement, founder of city teaching farms, editor-in-chief of magazine Le Cirque dans l'Univers.

Using vacant space as the engine for new economic development: the experience of Metropolitan Lille (France)

Located twenty minutes from Brussels, one hour from Paris and two hours from London, Metropolitan Lille today includes 87 communities around Lille (figure 1).

This urban community is home to 1,108,447 French citizens, and more than 600,000 Belgians live within a radius of less than 60 km from Lille (figure 2).

The metropolis suffers from a significant deficit in terms of public greenspaces. This lack of greenspace has, over the years, become an economic handicap.

Companies prefer to establish facilities in regions known to be pleasant in order to satisfy their executives and their families.

About 10 years ago, Pierre Mauroy, President of the Metropolitan Lille Urban Community, initiated a "Metropolitan Nature Area" as a response.

The idea was to create two large open sites in accordance with ecological, landscape, social and economic considerations. This involved work on several hundred hectares along the length of several kilometres of canals.

In September 2002, this programme was given new impetus by the decision of Metropolitan Lille to declare itself responsible for matters regarding nature areas. The urban community multiplied its budget by five to construct this metropolitan nature area, spending close to 15 million euros on it this year.

Currently, the "significant public greenspaces" of Metropolitan Lille occupy 2,000 hectares. The Lille zoning master plan, voted in September 2002, sets aside 10,000 hectares of green areas for "recreational and landscaping" purposes between now and 2015. This strategy takes in agricultural areas where a special vision will contribute to the landscape and the network of paths. Linking these zones will be the green master plan of the metropolis (figures 3, 4).

This strategy rests on a mapped objective and a charter of commitment uniting the main public participants: State, Regional, County, urban community. Our delegation, here in Barcelona, includes representatives of these entities. We must also be realistic. In order to carry out such an ambitious project, it is also necessary to create profit-making facilities, delegating services to the private sector, encouraging private sponsors to take on facilities under their brand name and trading image, or simply as profitable operations.

Our structure should ensure a consistent approach to managing the spaces with concern for durable development uniting the search for high environmental quality, a fair balance between economic, ecological and social demands and active participation on the part of the "users" of these parks, from designers to consumers via experts and participants.

We are developing very different sites, even though the fundamental principles remain the same. A site may be treated ecologically and designed as a place to get to know nature, or to discover our rural heritage, or to participate in cultural and sporting water activities. Such diversity helps to promote accessible green tourism.

The first major part of this "Green Metropolis" strategy opened in 1999 with the creation south of Lille of a huge landscaped park to link Metropolitan Lille to the boroughs of the ancient mining basin of Nord Pas de Calais, along the Deûle canal. This involved opening up almost a thousand hectares along 25 kilometres.

The Deûle park was designed by two landscape gardeners, Jacques SIMON, from Burgundy, and Jean Noël CAPART, from Brussels. The challenge was to restore agricultural

(figure 5) industrial sites or old industrial wastelands while protecting the level of the water table, which in this sector represents 34 % of the metropolitan water resources .

In a few years, we have created:

- 350 hectares of woods and reconstructed natural landscape
- almost 30 kilometres of paths and walks
- we are developing a network of farms open to the public
- we have also created a premier technical centre putting into practice architectural principles of high environmental quality.

In total, we have spent 16 million euros to date, that is, half of the total investment anticipated.

Moving on now to some of the most attractive aspects, we want to offer, each year from now to 2006, a new educational amenity:
In 2004: a 33-hectare park centred on the theme of gardens,
In 2005: a 110-hectare fauna and flora discovery park,
In 2006, a 130-hectare information centre about suburban farming and food.

Our investments are based on market studies conducted every two years.

Our most recent study (July 2002) gave us valuable information.

More than one metropolitan citizen in four goes to a greenspace every week, as long as it is located less than thirty minutes from home. The growing number of walkers want, above all, tranquillity, fresh air, encounters with nature and to be able to come with their families (figure 6).

70 % of the walkers want to see animals, eat together with their families (65%), take a boat out and make educational visits.

Nowadays, visitors to major greenspaces have specific expectations: they want to be offered educational walks based on nature observation or else gardening. They would like to go around the parks by bicycle, or on river shuttles. On the other hand, a growing majority find motor engines and hunting incompatible with the big parks (94% and 87%).

In short, what is particularly striking and new about this survey is the importance given to culture within the very concept of parks. Modern walkers expect their Sunday excursion to meet their spiritual needs, to be a learning experience. They want the parks to provide facilities associated until now with ecological museums or fauna and flora discovery centres (figure 7).

84 % of metropolitan citizens say that our green metropolis strategy should also be used to protect nature better, and 71% also want it to favour the creation of beautiful gardens based on specific themes (91% in favour).

These served to reinforce our most current projects, especially that of the Jardin des communautés [Community Gardens].

The Metropolis has been shaped by the arrival of very different communities. These women and men have built a metropolis where a large majority of inhabitants have one parent who was an immigrant from the north or south.

Each country, each culture has used gardens in its own way. We want to rediscover the spirit of different metropolitan communities' gardens in one place. We want to construct a convivial space, a contemporary work, a garden of stories and adventures that should aim to become a determined expression of modernity.

Although it is easy enough to find out the expectations of local inhabitants as regards the arrangement of outer suburban parks, the evaluation of the economic impact of our arrangements is a lot more difficult. Environmental assets have long eluded economic reflection. With the installation of the objective of durable sustainability, environmental policy is asked to base itself on a micro-economic approach to the environment. The environment is priceless, but the application of different methods of economic evaluation of natural surroundings shows that the totality of environmental "assets" has a value.

The protection and management of our natural surroundings have positive spin-offs. Such protection ensures an adequate supply of drinking water, and offers opportunities for agriculture, tourism and leisure. Hunting and fishing activities also generate economic exchange. All of these areas thus have economic value.

We should arrive at an evaluation of services supplied in order to help in deciding between public and private providers. Currently, nobody knows how to set a price in accordance with the extent of sacrifices to be made to obtain and conserve natural resources. Without an answer to this question, the economic participants tend to act as though the price of such conservation were zero, whereas it is simply not apparent.

We have learnt in our region, devastated by savage industrialisation in the 19th century, that the loss of this natural heritage had a huge cost in terms of attraction,

quality of life, and economic development as a result.

There are also utilisation values that could be established. For example, the value of one hectare of wetland could be based on the angling value of certain currently fished species. Even more precisely, it has been established that one hectare of wetland also represents a potential refining value of l kg of organic waste per day. Determining the average cost of refinement of 1 kg by a refinery, a valuation of around 1,230 euros per hectare and per year is reached (figure 8, Base des prés du Hem).

In the context of flood prevention, it has been shown, in a flood basin in Massachusetts in the USA, that the conservation of 3,370 hectares of wetlands produced an annual profit of 105 million dollars with respect to the construction of a barrage.

Unfortunately, these forms of evaluation are still at a very early stage in France. However, even if the evaluation is incomplete or imperfect, it shows us not only that the protection of natural outer suburban spaces is not necessarily a mere cost for the community, but that it can in fact be the source of environmental, social and economic benefits (figure 9, ecological corrior).

It would be necessary to be able to apply a combination of several methods to every site: contingent evaluation methods, a transport costs method, a method of fixed price applicable to utilisation values or to the existence of natural surroundings. In many cases, it has been possible to establish a value for natural and heritage assets, a value generally excluded from economic calculations but which in itself justifies the preservation of natural surroundings.

As regards the principle of free access to protected and subsidised natural areas, we must however face management charges. We should look into voluntary contributions or remuneration of services to complete public resources. This would involve a strong management structure, which is found more willingly in the organisation of outer suburban parks than in that of natural reserves.

If management has a cost, the absence of management of frequentation also has a price, often very high, for the environment. Welcoming the public to natural sites often costs more than appears. But it is an unavoidable expense which can be passed on to the visitor. The attraction of a natural space arranged for the reception of the public has spin-offs which have long term benefits for the local economic context, even though the association is not obvious.

In the case of the Deûle park, part of our plan was set up so that maintenance would provide work adapted to the machinery owned by farmers, thereby making it possible for the farmers to bid for maintenance contracts. Five of them have moved into new markets in this way. We favour insertion of agricultural exploitations into the landscape and we finance diversification initiatives (direct sale, lodging etc.) (figure 10). We also work with real estate agents to ensure that a range of quality housing is available on the periphery of our sites.

The creation of the park has had a significant and undisputable impact on the value of real estate on the periphery. The average price of an upmarket dwelling has been recorded as rising 10% more than the metropolitan price rise. We must take measures to protect the land against accelerated speculation born of a revalued environment.

We must give maximum rein to the complementary roles of the private and public sectors. For example, we generate the material for green classes but we favour the private sector to enable it to provide different types of lodgings.

To further this approach, we intend to install an evolutionary observatory on the sites to regularly measure those indicators that need to be monitored:

- enrichment of biodiversity
- evolution of landscape
- evolution of habitat
- evolution of economic activities

in order to measure the global economic impact of our sites and the taking into account of our facilities.

It is a precision task, not at all easy to put in place. We are prepared to work on this indispensable measure with other partners in FEDENATUR.

Here ends our contribution. We really feel there is a lot left to do to make people aware of, measure and study the evolution of this economic evaluation of large outer suburban parks.

For us, 2004 is an important year, with the opening of several new sites, as Lille is the European Cultural Capital 2004 and …… we shall be especially proud to welcome you to Lille for the occasion.

Murray, Ray

Team Leader for Planning and Partnerships coordinate park planning, environmental compliance and fund raising activities and programs for National Park units in California, Nevada, Hawaii and the far Pacific. Also administer the Land and Water Conservation Fund, Urban Park and Recreation Recovery Act Program, Federal Landsto-Parks and the Rivers, Trails and Conservation Assistance Program. Currently Partnership Programs and Tourism Lead for the Pacific West Region.

Economic benefits of networks of open spaces

(This text is an extract from the book *"Economic impacts of protecting rivers, trails and greenway corridors, a resource book"*. Rivers, Trails and conservation assistance National Park Service, 1995 Fourth edition revised)

Rivers, trails and greenway corridors (linear open spaces connecting recreational, cultural and natural areas) are traditionally recognized for their environmental protection, recreation values, and aesthetic appearance. These corridors also have the potential to create jobs, enhance property values, expand local businesses, attract new or relocating businesses, increase local tax revenues, decrease local government expenditures, and promote a local community.

The non-monetary value of open space (the intrinsic environmental and recreational benefits of rivers, trails, and greenway corridors) should continue to be the primary emphasis in conservation efforts. In some cases, it may be more appropriate to stress intrinsic environmental benefits rather than spend considerable time and effort conducting economic analyses. In other cases, especially in developing areas, clear communication of intrinsic values and potential economic impacts will help decision makers recognize rivers, trails, and greenway corridors as vital to the well-being of a community.

I- REAL PROPERTY VALUES

Greenway corridors provide a variety of amenities, such as attractive views, open space preservation, and convenient recreation opportunities. People value these amenities. This can be reflected in increased real property values and increased marketability for property located near open space. Developers also recognize these values and incorporate open space into planning, design, and marketing new and redeveloped properties.

Increased Property Values - Quantified

The effect on property values of a location near a park or open space has been the subject of several studies. Statistical analyses have been a common method of attempting to measure this effect. These analyses attempt to isolate the effect of open space from other variables which can affect property values, such as age, square footage, and condition of homes. Isolating the effect of open space can be difficult and results have been varied. Nevertheless, many studies have revealed increases in property values in instances where the property is located near or adjacent to open spaces. Most studies have addressed traditional parks or greenbelts (large open space areas), though a few studies are available for greenways.

Increased Property Tax Revenues

An increase in property values generally results in increased property tax revenues for local governments. Many arguments made for park and open space investment claim these acquisitions pay for themselves in a short period of time, due in part to increased property tax revenues from higher values of nearby property. A point to remember, however, is that many jurisdiction's assessments of property values often lag behind market value.

Construction/Development Perspectives

Proximity to greenways, rivers, and trails can increase sales price, increase the marketability of adjacentproperties, and promote faster sales. Clustering the residential development to allow for establishment of a greenway might also decrease overall development costs and result in greater profits for the developer.

Local ordinances may also provide incentives for developers to set aside open space and habitat areas. In Lee County, Florida an ordinance gives developers incentives to preserve critical habitat. In return for preserving habitat areas, developers are permitted to transfer development rights from the preserved area to other portions of the parcel. Habitat buffer areas can also fulfill applicable open space requirements and can be credited toward regional park impact fees.

II- EXPENDITURES BY RESIDENTS

Outdoor Recreation, a Spending Priority

Leisure is often considered to be discretionary or free time, away from work and other responsibilities, where participants choose and control their activities. Leisure activities can vary from mountain climbing, walking for health, or watching a football game on television. Outdoor recreation is a major component of leisure, usually included in leisure spending figures unless reported otherwise. Outdoor recreation and leisure expenditures can account for a substantial part of people's discretionary spending. People spend more on leisure and recreation than the U.S. Government spends on national defense or housing construction.

Spending by Local Residents

You can define your local economy as the area for which you want to quantify the recreation activity and expenditures related to your greenway project. A greenway project can attract residents not only to the greenway, but also to nearby businesses, and encourage residents to purchase recreation-related equipment and services. These greenway-related expenditures help support the local economy through generation of employment and income.
Specifically, local residents who use the greenway may spend money to get to and from the site, on supplies and equipment to pursue their recreation experience, at on-site concessions and events, and nearby attractions. The magnitude of the impact of these expenditures depends upon the boundary and character of your local economy and the level of spending by local residents.

If a new resource is created which attracts visitors, or non-residents, then outside dollars may be brought into your local economy. River, trail and greenway resources which attract visitors can stimulate economic activity and create new jobs and income.

III- COMMERCIAL USES

Greenways can provide business opportunities, locations, and resources for commercial activities. These activities may include on-site concessions, permittees, partnerships between the managing agency and other groups, special events, and commercial filming activities. Compatible business ventures can provide a wide range of visitor services and facility improvements.

Documenting and estimating the economic impacts of the commercial uses associated with rivers, trails, and greenways can be useful in promoting your corridor project. Demonstrating these impacts might also help to expand a project or provide information to assist greenway promotion in other communities.

Concessions, Permittees, and Partnerships

Concessionaires, permittees, and partnerships are recruited and usually bid for the right to provide a range of on-site visitor services which a public agency chooses not to operate. Typical examples include food services, recreation equipment rentals and sales, lessons, lodging, and convenience items. These services directly serve and enhance the recreational experience of greenway users.

Concessions, permittees, and licensees are usually privately operated entities, mostly for-profit though sometimes non-profit, that operate on public land by authorization of the managing agency or group. A partnership is similar, but most often involves non-profit entities. These activities can have a significant effect on a local economy.

Another type of partnership has been appearing across the country between private utility companies and trail managing entities. Telecommunications companies, for example, have made agreements to route fiber-optics within the trail corridor in return for compensation, which can often help in building and maintaining the trail. Other potentially compatible utilities that might generate income include: cable television wires, gas pipelines, electric transmission and distribution lines.

Special Events

Special events not only generate revenues to sponsors and the community, but promote the greenway itself to residents and visitors.

Special events can also be used to raise money and promote the greenway or trail itself. Such events can serve as a catalyst to gain support, strengthen volunteer organizations, and raise public awareness of your project. You should report this economic activity as testimony of support for your greenway.

Filming and Advertising

Unique and scenic areas are desirable as location backdrops for movies, television, and photo sessions for magazine and newspaper advertising. Fees paid to use these areas, in addition to the money spent locally by film production crews during filming sessions, are beneficial to the managing local agency and the local economy. Media exposure of a river, trail, or greenway can also help to promote the area and attract visitors.

IV- AGENCY EXPENDITURES

The expenditures of the agency responsible for managing a river, trail, or greenway can contribute to the local economy. Agency expenditures contribute to economic activity, providing payrolls and support to a myriad of businesses.

Level of Expenditures

The managing agency supports the local and regional economy by providing jobs and purchasing supplies and services to develop, operate, and maintain the greenway and related improvements. Benefits to the local community are greater if supplies and services are purchased from local businesses. The following examples illustrate the level of expenditures which potentially impact the local community. Expenditures must be reviewed in detail to determine how much is spent locally.

Employment generated by a greenway project can be targeted by the managing agency to benefit particular needs of the community. For example, programs may be implemented to employ population segments suffering from high unemployment.

Local Business Support

Agency expenditures are more important to some businesses than others. Some businesses or contractors may be dependent upon local recreational open space agencies for a significant portion of their revenues.

V- TOURISM

Greenways, rivers and trails which attract visitors from outside the local area can stimulate the local economy.

The Travel Industry

Travel and tourism is the leading employer in several states and has been predicted to be the leading industry in the United States and the world by the year 2000. Travel is also a leading industry and source of jobs within regions and local communities, and is increasing in relative economic importance. Expenditures for travel and tourism impact transportation, lodging, eating establishments, retail, and service businesses. These expenditures support jobs, personal income, and government tax revenues.
A greenway, which provides local opportunities and enhances tourist draw, can be an important asset to your community. Recent trend analyses show that weekend trips to nearby areas are on the increase, while the traditional two-week summer vacation is on the decline for today's travellers. This is due to the job complications of two-income families, limited time budgets, interest in more specialized recreation experiences, increased mixing of personal and business travel, and year round schools.

Natural / Cultural Areas Attract Travellers

Outdoor recreation, natural, historical and cultural resources are increasingly important attractions for travellers. Ecotourism is an environmentally responsible form of travel in which the focus is to experience the natural areas and culture of a region while promoting conservation and economically contributing to local communities. Ecotourism is one of the fastest growing areas of the travel industry. According to the Travel Industry World Yearbook, in 1992 ecotourism comprised 10 to 20 percent of all travel. Travellers are also increasingly attracted to educational-oriented experiences provided by cultural and historic sites. Along with recreation and beautiful natural sites, tourists cite cultural heritage as one of three major reasons they travel to specific locations.

One of the fastest growing areas of tourism includes cultural and historic community festivals, events, and competitions. This will

be a boon to community-based tourism. Greenways and trails can provide a link between historic and cultural sites. For example, the Azalea Trail in Mobile, Alabama, serves as a city beautification project and attracts tourists. Because preservation of these historic sites serves as a stimulus for tourism, there can also be significant impacts to the local economy.

Attributing Expenditures to Rivers, Trails and Greenways

Greenways, rivers, and trails can have varied levels of tourist draw. They can be travel destinations in themselves, encourage area visitors to extend their stay in the area or enhance business and pleasure visits. The "level of tourist draw" determines the appropriate proportion of the visitor's time and travel expenditures that can be attributed to the greenway. If visitors extend their trip an extra night to visit a greenway, the additional night's lodging and meals can be attributed to the greenway.

Tour operators, outfitters, and guides are also important to local economies due to the expenditures their businesses generate, the fees they pay to operate, and their advertising and promotion of local resources. Some companies such as "A Day in Nature," based in San Francisco, which offers a day in nature complete with a gourmet picnic and door-to-door transportation, have capitalized on the demand for nature-oriented experiences.

Marketing Potential

Rivers, trails, and greenways provide unique resources which nearby travel and tourist-serving establishments, chambers of commerce, and local visitors bureaus can capitalize on and feature in their advertising. Because a greenway is a desired and profitable amenity for these businesses, they may also be willing to contribute to the funding and development of the greenway.

VI- ESTIMATING THE EFFECTS OF SPENDIN

Direct, Indirect, and Induced Effects

The actual amount spent by greenway visitors, from out of the local area, at businesses within your local economy represents only a portion of the total economic activity resulting from this spending. For instance, greenway visitors purchase goods and services from local businesses. In turn, these businesses and their employees purchase goods and services from other businesses, thereby creating a chain reaction. These purchases of goods and services between firms occur between different economic sectors, such as manufacturing, agriculture and transportation. Therefore, an increase in visitor expenditures is likely to impact related sectors in the economy.

The total impact resulting from an increase in visitor expenditures can be described in terms of direct, indirect, and induced effects. Understanding these three levels of effects is important because they show how the initial greenway related expenditure generates additional economic activity within your local or regional economy.

Economic Effects of Greenway Expenditures

DIRECT EFFECTS
Purchases by greenway users

+

INDIRECT EFFECTS
Purchases of supplies and materials by the producers of greenway-related products and services, and the purchases made by the producers of the supplies and materials

+

INDUCED EFFECTS
Purchases of production supplies and materials by producers, resulting from purchases by households

TOTAL ECONOMIC EFFECTS OF GREENWAY EXPENDITURES

Visitor expenditures that may be attributed to a protected river corridor, for example, may include food and beverage, fishing

equipment, and gasoline for vehicles and boats. Direct effects result directly from the actual purchases by visitors. Local businesses meeting the river visitors' demand for goods and services must purchase supplies to meet this demand. These purchases (of food and beverage supplies, fishing equipment and gasoline, for example,) by the local businesses, are direct effects. Direct effects are also referred to as first round purchases in some studies.

Indirect effects occur when the suppliers to these local businesses must increase their purchases of production materials and services from other businesses and those businesses in turn increase their purchases. A chain reaction is created as each supplier must increase their purchase of inputs. Each exchange increases the total indirect effects. For food and beverage, indirect effects are when the local food manufacturers purchase additional produce from local farmers, and the farmers then purchase additional supplies in order to grow products necessary to meet the demand. Another example might be fishing equipment. For instance, the indirect effects attributed to a fishing rod would include purchases by the rod manufacturer for graphite and other materials, and the graphite manufacturers (if local) purchases of local supplies. Thus, indirect effects extend to sectors of the economy beyond recreation-oriented businesses, such as agriculture, manufacturing, and transportation.

The direct and indirect effects of increased spending by greenway visitors can result in an overall increase in the production of goods and services in the local economy. This increase in economic activity can also increase jobs and household incomes within the economy. A portion of the incomes is then spent on other goods and services.

Consumer purchases resulting from the increased income of business owners and households set in motion another sequence of expenditures and purchases. The sum of these impacts over and above the direct and indirect effects are the induced effects. For example, the induced effects would include all the purchases made by households which receive wages from their employment at the rod manufacturer or local market. Induced effects result from wages paid to households by both directly and indirectly affected businesses. These induced effects can be estimated from economic impact models.
If you estimate the direct, indirect, and induced effects of visitor expenditures, you can show the total economic activity which can result from your greenway project. For recreation expenditures, the total economic effects, whether sales, jobs or income, are often approximately one and a half to three times more than the amount of the actual recreation-related expenditures. The magnitude of direct, indirect, and induced impacts depends on the number of visitors attracted to the greenway; the amount they spend; the structure and diversity of the local economy; and the quantity of input supplies purchased within your local community. If the local businesses purchase all their input supplies from outside the area, the direct and indirect impacts on the local economy would be zero. Similarly, if employees reside outside the community they are much less likely to spend their income at local businesses and induced impacts are likely to be minimal.

VI- CORPORATE RELOCATION & RETENTION

Many communities want to attract new, expanding, or relocating businesses to their area in order to increase their employment and tax bases. Retaining existing businesses within a community is even more important for economic stability. This section discusses the importance of quality of life factors in attracting new and relocating businesses. Greenways, rivers and trails contribute to quality of life, and their use is a benefit to corporate employees for exercise and relaxation.

Quality of Life Attracts Businesses

The importance of quality of life in an area is increasingly cited as a major factor in corporate and business location decisions.

One aspect of quality of life is a location with convenient access to natural settings, recreational and cultural opportunities, and open space.

Greenways Contribute to Quality of Life

Greenways, rivers, and trails can play an important role in increasing a community's quality of life, and are attractive to businesses and corporations. Office site locations adjacent to rivers, trails and greenways are also likely to be more attractive to prospective tenants than sites lacking such amenities. Developers and property managers recognize these amenities.

Greenways Promote Employee Fitness

Businesses are realizing the benefits of healthy employees, both in increased efficiency and decreased health insurance claims. Greenways help promote fitness by providing convenient opportunities for exercise, such as walking, jogging, or exercise courses.

Greenways and trails also help reduce firms' employees' commuting costs because they provide opportunities to commute by foot or bicycle.

VII- PUBLIC COST REDUCTION

Conservation of greenways, rivers, and trails may result in reduced costs to local governments and other public agencies. By conserving a greenway corridor rather than permitting intensive development, local agencies may reduce costs for public services such as sewers, roads, and school facilities. Establishing a greenway in an area prone to hazards, such as flooding, may decrease costs for potential damages. Greenways and associated vegetation can also help control water, air and noise pollution by natural means, resulting in potential decreased pollution control costs. Greenways and trails may promote physical fitness, leading to decreased public health care costs.

Public Service Requirements

The choices between retaining undeveloped lands as open space and allowing residential development must be considered. How this choice affects public expenditures and the tax base is often the subject of debate. Expansion of the tax base is not always beneficial in the long term. Expansion almost always results in increased public service requirements. In many situations, the cost of providing these services to residential development is much higher than the revenues to local governments resulting from the expanded tax base. A list of development costs could include:

Transportation and Utility costs
- Roads
- Public and private utilities
- Sanitary sewage
- Water
- Natural Gas
- Electricity
- Storm sewage

Facility and Service Costs
- Open space, recreation, and libraries
- Schools
- Health care
- Police and fire protection
- Mail delivery
- Solid waste collection and disposal

Hazard Mitigation

Use of geologically or environmentally sensitive areas for open space or recreation purposes can reduce potential property damage costs and loss of life. Hazards which can be mitigated through conservation of open space include flooding, slope instability, structural fire damage, and earthquake losses. Many of the available examples focus on flood control.

Pollution Control

Researchers have found that natural properties of plants and trees help mitigate water, air, and noise pollution. Greenways which help conserve such plants and trees provide a valuable contribution toward pollution control. These natural abilities are described below. Pollution can also be decreased by establishing trails and greenways which encourage people to walk or bicycle rather than drive automobiles.

Establishment of a greenway along a river or stream helps maintain water quality because riparian vegetation helps filter out pollutants. Riparian vegetation serves as an effective buffer between a stream and adjacent agricultural area. The retention capabilities of this vegetation prevent many agricultural chemicals from polluting the stream. A study of an agricultural watershed and riparian forest in Maryland found that if the riparian forest were removed, there would have been twice as much nitrate / nitrogen lost to the stream.

Man-made wetlands are making their way into the spotlight because of their ability to improve the quality of polluted water from sources such as municipal wastewater, storm water and agricultural runoff and acid mine drainage. Wet-lands are formed in chambers which the water passes through as the pollutants are filtered by various biological processes. The water leaving the wetland will be cleaner and higher quality than it was before treatment.

Riparian habitat within a greenway may also serve to keep water temperatures cool by shading the stream and thereby improve conditions for fisheries. Restoration of Boulder Creek in Colorado illustrates how a stream restoration
Greenways can also help reduce other adverse impacts of urbanization. Drastic alterations of a ground surface, such as compaction or paving can reduce the infiltration capacity of a surface, which can cause a serious reduction in groundwater recharge and an increase in runoff.

Greenways help reduce the impacts of noise in two ways. First, greenways serve to maintain distance between the noise source and receiver. Secondly, greenways can include planting barriers, such as tree belts and grassy areas that have the natural ability to absorb, deflect, and refract sound. The effectiveness of plants in controlling noise varies, depending upon the characteristics of the sound, the type, height, density and location of the planting, and climatic factors. Although solid sound attenuation walls may still be necessary to mitigate noise impacts, the distance buffer of greenways and the natural ability of plants should not be overlooked.

Greenways as buffers may also have a visual and psychological advantage over masonry wails. Greenways also help control air pollution because plants are natural air cleaners. Plants cleanse the air through the process of photosynthesis, which removes carbon dioxide from the air and returns oxygen. Specifically, plants control air pollution through oxygenation and dilution. Oxygenation refers to the introduction of excess oxygen into the atmosphere. The ability of plants to introduce excess oxygen into oxygen-deficient air serves to readjust the balance. A wide greenbelt along a highway could readjust the air balance in the area. Plants also act as cleansers by absorbing pollutants directly into their leaves and assimilating them. Vegetation can absorb ozone, sulfur dioxide, carbon monoxide, and airborne particles of heavy metals.

Health Care Costs

Active use of a river, trail, or greenway by community residents can help improve their physical fitness and health. Studies have shown that exercise can reduce health care costs. These costs savings may be shared by public health services, employers, and individuals.

- For every mile a person walks or runs, they will save society 24 cents per mile in medical and other costs. These figures are the results of a theoretical model developed by the Rand Corporation.

- Recreation activities involving exercise reduce health care costs. People who exercise regularly have 14 percent lower claims against their medical insurance, spend 30 percent fewer days in the hospital, and have 41 percent fewer claims greater than $5,000. These figures were taken from a Corporate Wellness Study for the city of San Jose, Department of Recreation, in 1988. In 1991 the average American family paid nearly 12 per cent of average family income for health care, according to a Families USA Foundation study. By the year 2000, the study predicts families will be paying over 16 per cent of their income for health care.

Exercise derived from recreational activities lessens health related problems and subsequent health care costs. Every year, premature deaths cost American companies an estimated 132 million lost work days at a price tag of $25 billion. Finding and training replacements cost industry more than $700 million each year. In addition, American businesses lose an estimated $3 billion every year because of employee health problems (National Park Service, 1983).

VII- BENEFIT ESTIMATION

Greenways, rivers, and trails provide many benefits which do not have established market values and are difficult to price and express in monetary terms.

Introduction to Benefit Estimation

Total recreation benefits are defined as the sum of the maximum amount individuals are willing to pay to engage in a recreation

activity, rather than forego it. This concept is referred to as willingness-to-pay and is the method recommended by the Water Resources Council, a U.S. government interagency advisory committee, as an appropriate economic measure of the benefits of outdoor recreation.

Assessment Methods

Several methods can be used to estimate willingness-to-pay, or the benefits to users. Three methods are generally considered acceptable for measuring the benefits of recreation activities: the unit day value, the travel cost method, and contingent valuation. These methods are somewhat complex and will likely require the assistance of a specialist in recreation economics.
The unit day value approach is considered appropriate for estimating the benefits from recreation activities at small sites. This approach relies on expert judgement to determine benefits to users, or the average user willingness to pay for the opportunity to recreate at a given site. Planners, managers, and economists have developed a wide variety of unit day value estimation methods. We now turn our discussion from the unit day value method to the travel cost method. The travel cost method is based upon assessing travel expenditures to and from a recreational resource as a measure of recreational benefit. The underlying assumption of this approach is the number of trips to a recreation site will decrease as the monetary and time costs of travel increase. This is an appropriate approach when trying to estimate the demand by the current population of users. This method involves creation of demand curves to estimate how many trips would be taken as one-way travel distance to the recreation destination increases.

As opposed to the travel cost method, the contingent valuation method uses a bidding approach to determine values of recreation resources via hypothetical market transactions. It can be used to evaluate the benefits of resources to the general population (users and non-users) and can also be used to evaluate the impacts from potential changes in resource availability, or quality

In the past few decades, there has been increasing interest by researchers to expand the application of benefit-cost analysis to include valuation of natural systems and environmental quality. Valuing the benefits of environmental quality and natural resources in economic terms may be helpful to your justification for conservation of a river, or establishment of a greenway. Performing a benefit-cost analysis for your project is likely to require assistance from either an economist, or staff and volunteers with an economics back-ground. There are also aspects of environmental quality and natural resources which are important but still cannot be readily quantified. This may result in low benefit-cost ratios and underestimate the full benefits of your greenway.

Considerations in Using the Rationales

Numbers are not everything. Remember that estimates of economic impacts and benefits are only one tool available to conservation advocates. As mentioned earlier, many of the benefits of greenways may still not be quantified and numbers would underestimate the total value. Rivers, trails, and greenways should be promoted using the tools which are most effective. Focusing on the intrinsic values is most likely to be the most effective tool to begin building your constituency.

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Trends and Perspectives on Open Spaces: The European Union's Contribution

(The opinions expressed are those of the author.)

The European territory is a highly fragmented and fragile territory, not only from an environmental standpoint, but also from social and economic standpoints. On top of this we must add its political and administrative fragmentation. In any event, it is becoming more and more obvious that only integrated environmental management through a consensus-based process among all the interested parties can truly lead to sustainable development.

The concept of sustainable development is based – at least theoretically – on the integration of environmental protection, economic development and social promotion in all political and human activity, with the purpose of enabling future generations to at the very least have at their disposal the same economic and natural resources that we have now.

The reality, unfortunately, is quite different. The word 'sustainability' is on everyone's lips, especially in political forums and on electoral agenda, yet very few people or groups make genuine efforts to apply it. In my opinion, two factors complicate this process: policymakers' difficulties in achieving "long term" objectives which, being long-term, are not profitable in terms of elections; and the technical and administrative complexity involved in carrying out a policy of sustainability. In effect, the true application of sustainability would involve a real cataclysm in the usual administrative practices and decision-making processes, in the business world, among policymakers and among average citizens. The main reason for this lies in the fact that sustainable development necessarily involves integrating policies and levels of decision-making that have traditionally been separate. Likewise, it assumes a consensus which takes into account all levels of decision-making, adapting the decision to the specific reality and specific needs of the citizens and territories in which they must be applied. The catch phrase "integrated management" is thus the key idea.

The problem of integration

- Horizontal co-ordination: sectors
- Different administrative frame-works for regional organisation
- Vertical co-ordination: decision-making
    - Lack of coherence
    - Conflicting interests
    - Difficulty reaching consensus

Regardless of the seriousness of the problems, the greatest stumbling block to integrated land management is political in nature. Our democratic society and our culture, not only in the EU and its candidate countries but also taking into account "greater Europe" in the geographical sense, drag along a counterproductive dead weight: the identification of the allocation of responsibilities with a defence of these at any cost in an individualised way. Thus, the political differences within the Community, or merely – applying the principle of subsidiarity – the different national, regional or local responsibilities, which are reminiscent of the isolation among the different sectors, serve as an enormous impediment to the coherence of an integrated management of the territory and its resources, which would lead to sustainable development and overall well-being.

Nevertheless, it is clear that the sectoral policies generate effects that have direct repercussions on and because of themselves, and that, unfortunately, they tend to have these repercussions without having internalised the principles of sustainable development.

Sector and activities	energ	trans	agri	ind	Int.M.	fish
Clim change						
Air quality						
Noise						
Water quality						
Waste						
Ozone layer						
Biodiversity						

Environmental effects of human activity

In the early 1990s a change in mindset began to emerge. The 1992 Rio Conference paved the way for a significant process of awareness-raising. Last year, Johannesburg demonstrated to us not only the advances made but especially the difficulties for the political message to not just remain mere well-intentioned declarations.

Almost 80% of the European population lives in urban areas. Between 40% and 60% live in coastal areas. That is, environmental pressure is especially strong in those areas with greater demographic density and intense human activity. It is for this reason, for example, that in 2002 the European Parliament and the Council approved a Recommendation that the member states create a strategy for integrated management of their respective coasts. (Recommendation by the European Parliament and Council dated 30 May 2002 on the creation of integrated management of coastal areas in Europe (2002/413/EC), published in the OJEC L 148 on 6 June 2002.)

But there also exist particularly fragile areas whose biodiversity is constantly and increasingly threatened, not only due to the causes known to everyone, which are linked to breakneck development, but also especially, in our opinion, to the difficulty in co-ordinating responsibilities and interests, which are frequently contradictory. This is the case of urban or outlying parks in the cities, and it constitutes one of the main reasons why the Commission, after a slow yet continuous evolution since the early 1990s, has managed to clearly define the specific importance of cities.

Without entering into details which do not fall within the scope of this text, suffice it to recall that the first actions specifically aimed at urban areas were made thanks to the Commission's right to initiative, through a series of programmes for urban pilot projects and European co-operation among the public authorities at the local and regional level (without direct intervention by the states).. The topics were quite variable, but land planning or management and environmental problems occupied a fair and well-deserved place in them. These programmes were well received all over Europe. Back then, the possibility of incorporating participation by the central and eastern European countries in these co-operation networks was being negotiated. Likewise, this decade was a fertile period in terms of research projects, with important prospective studies being financed, paving the way for the Europa 2000 and Europa 2000+ documents, which analysed the overall trends in terms of the different Community policies and predicted a non-sustainable future in the European territory as a whole if these policies continued to be applied in the way they had been until then.

Within the specifically urban framework, the pilot projects being financed were, however, markedly socio-economic in nature, based above all on the reconstruction of neighbourhoods in crisis, on renewing impoverished areas, on improving the historical and artistic heritage and on revitalising the urban fabric and its commercial activities. The financed actions favoured many environmental factors (the creation of green and leisure areas, a decrease in vehicular traffic, noise and pollution reduction and so forth), but in my opinion they did not take into account the sustainable planning of urban areas and, more importantly, they did not establish a direct link between the process of periurbanisation and its consequences on the surrounding territory.

Urban expansión

Dublin 1956

Dublin 1998

The challenge of protecting and improving the urban environment requires integrated management because this methodology promotes the inter-relation of urban problems due to its comprehensive focus. Among others, a key element includes adapting the instruments to solve local problems, that is, facilitating maximal flexibility so that Community, national or regional regulations in those spheres in which urban actions have repercussions on the surrounding territory and vice-versa, can be adapted to specific circumstances. Among these instruments, which might include voluntary agreements, tax and other types of incentives, subsidies and so forth, citizen involvement is essential.

In addition to the difficulty of vertically co-ordinating the different levels of decision-making, there is also the difficulty of getting citizens fully involved through information dissemination, discussion forums and

mechanisms that enable their opinions to be taken into account.

The desire for consensus is, therefore, fundamental. In contrast, the pilot projects and studies realised on the implementation of integrated management in approximately 30 European towns, within the framework of studies on the management of coastal areas, demonstrated that the proposed methodology was appropriate for any type of specifically fragile or threatened territory, not only from the purely environmental standpoint but also more broadly from the standpoint of sustainable development. Its main conclusions include the absolute necessity of reducing the rift between the scientific knowledge coming from academia and the direct users, that is, the municipalities and their inhabitants.

Problema at a local level

Lack of information and exchange of good practices

Organisational and technical problems

Lack of adaptation between financial resources and responsibilities

Top-down regulations without flexibility in their application depending on the concrete, specific reality

Difficulties changing individual behaviour

In the urban domain, there is a concentration of a series of problems in which responsibilities and sectors are superimposed, thus making them much more complex to solve. The main problem is global management, but this is also the most difficult to overcome, not only due to the traditional division of responsibilities but also to a cultural vision of the control and definition of areas of action that excludes a co-ordination that is generous with other sectors. This can also be attributed to the intrinsic need for technical specialisation which arises, reducing the capacity to gain a global focus.

The challenge of the urban environment

- Integrated focus - integrated management
- Adaptation of the instruments in order to solve problems on a local level
- Desire for consensus
- Reduction of the rift between scientific knowledge and local users and managers
- Changes in models of behaviour
- Reduction of the environmental impact of human activities

Among its actions, the 6th Environmental Programme envisages developing a series of Thematic Strategies.

The Directorate General for the Environment, a service of the European Commission that has traditionally focused its activities on the creation of a legal framework, is aware of the need to centre efforts now on compliance by using all the instruments at its disposal. This means not only actively following through with the transposition of Community law to national laws and acting with due diligence in the event of infractions, but also encouraging to the extent possible all those activities that can assist this compliance without resorting to coercive means, by fostering and stimulating coherent, co-ordinated planning of the difficult policies in the long term, or by promoting training and information dissemination actions aimed at the European citizenry and its leaders.

6th Environmental Action Programme

- Approved in mid-2002:
  climatic change
  nature and biodiversity
  environment and health
  management of natural resources and waste
- Highlights urban and sustainability issues
- Global strategic focus
- Candidate countries: a challenge

The strategic focus is especially developed in seven different areas, one of which is precisely the issue of urban areas. Not only is this approach novel, the sector itself is too. The European Union has no responsibilities in urban policy, but the member states, by approving the 6th framework programme, have demonstrated their understanding of the seriousness and importance of the problems that intersect in urban areas and the need to search for new solutions to a situation of deterioration and environmental pressure in an area where almost 80% of the European population resides.

Thematic Strategies
6th Environmental Programme: Strategies as a new avenue

· Land protection

· Protection and conservation of the marine environment

· Sustainable use of pesticides

· Integrated, coherent policy on air pollution

· Waste recycling

· Urban

Likewise, a European vision is gradually gaining credence and taking root which, beyond political demarcations or those of the different national interests, promotes a coherent, and thus sustainable, approach to the land, its

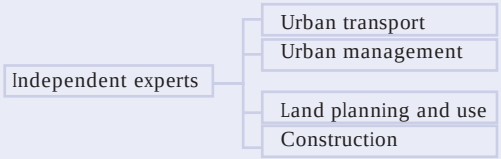
resources and its development.

The Water Framework Directive (European Parliament and Council directive establishing a Community framework on actions in the sphere of water policy, Official Journal no. L 327 dated 22/12/2000, p. 1-71.), for example, and the Directive on Plans and Programmes are extraordinarily novel instruments on the European scene because they go beyond the national or regional framework to reach across borders. The concept of a single hydrographic basin, already existing in Spain, is especially meaningful when applied to the European territory, in which its major water basins cross various countries and thus cannot be managed without taking into account a global assessment of the consequences for the basin as a whole.

From a strictly urban standpoint, the main objectives of the work underway to develop the Thematic Strategy will be to maximise the efficacy and quality of urban areas; to mitigate the direct impact of urban areas on their natural support systems and on human health; and finally, to manage with a future-oriented vision this process and its impact on a broader territorial scale, that of urban regions.

Urban Strategy Methodology

· Interservices group
· Commission communication at end of 2003
· Broad consultation with stakeholders
· Thematic Strategy in 2005



The latest information on the work underway by the Commission and the different independent expert groups in order to develop the thematic strategy on the urban environment can be consulted at the following address:

http://www.europa.eu.int/comm/environment/urban/thematic_strategy.htm

The Directive on Plans and Programmes (Proposed directive from the European Parliament and Council establishing measures for public participation in the development of certain plans and programmes related to the environment, which modifies Directive of the Council 85/337/EEC and the Directive of the Council 96/61/EC* COM/2000/0839 final - COD 2000/0331 */ Official Newsletter no. C 154 E dated 29/05/2001 p. 0123 – 0128.) is especially meaningful because it effectively breaks with the traditional focus of evaluating the environmental impact of large infrastructures from the exclusive standpoint of individual projects. Taking into consideration, in this case as well, a global impact analysis related to all those individual projects that make up part of a plan or programme will be a highly meaningful step forward. Thus, for example, the traditional impact assessments carried out individually for the construction of stretches of motorway, in compliance with the directive on impact (Directive 97/11/EC of the Council dated 3 March 1997 which modifies Directive 85/337/EEC on the assessment of the repercussions of certain public and private construction projects on the environment Official Journal no. L 073 dated 14/03/1997 p. 0005 – 0015.), will give way to an overall assessment of the entire motorway. This will necessitate the environmental impact to be analysed in territorial domains that will frequently be larger than a certain district, and it will establish a more elaborate dialogue among the different stakeholders and citizens.

All of these regulations are instruments which are encouraging the trend to act jointly in several different areas and leave behind the habits of analysing problems on an individual basis. There is still a long way to go, and the majority of the journey will depend on European citizens' degree of awareness and what they want to demand from their leaders.

For its part, the European Union must use its right to initiative to promote new policies or actions, strengthen its role as the guardian of the treaties and at the same time respect the principle of subsidiarity, without interfering where lower levels including national, regional or municipal authorities can act with greater efficacy. Only co-ordination among all spheres of decision-making and citizen pressure backed by accurate information can make us move forward as one toward sustainable development.

The EU's role

Subsidiarity

Ensure that EU policy / legislation:
- takes into account urban conditions and consequences
- allows for good governance
- has a horizontal, cross-sector focus

Cross-border implications:
- pollution has no borders
- international treaties and agreements

The European Union can hardly (and should not) interfere in the local domain; however, it can act as a catalyst when there are conflicting interests and situations, especially in the international sphere. Above all, it can facilitate the dissemination of information and good practices, thus helping to pave the way for those European regions

that are encountering specific difficulties to launch themselves into the realm of sustainable development, which although it has been part of our daily vocabulary for ten years, still remains virgin territory.

How can the EU itervene?

Promoting co-operation and the creation of networks

Disseminating information on results and good practices

Emphasising the importance and potential of integration:

- among the different sectors
- among the different levels of decision-making (from EU to local)
- by involving the intersted parties
- by searching for consensus-based solutions

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Urban Region as Land Mosaic

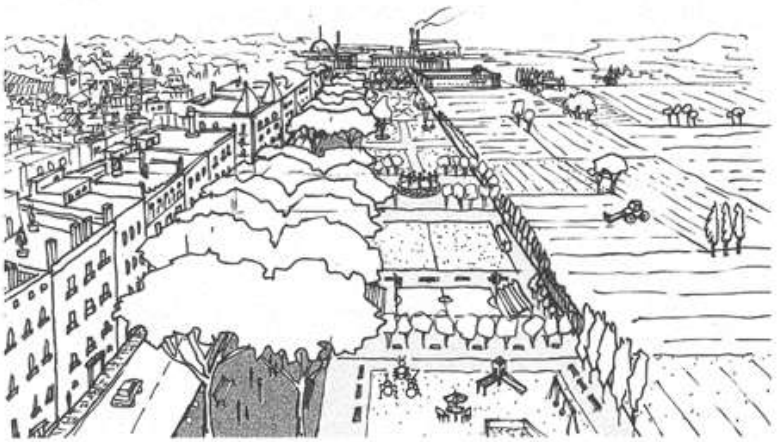
In but a single human generation, the urban region and the forest landscape have become the two greatest challenges of history. Resource-rich forest landscapes, once thought to be inexhaustible, essentially infinite, have been acceleratingly cut, shrunk or extinguished. Today we can count the few undegraded ones remaining and we live among remnant bits of the others.

Concurrently the urban region has mushroomed outward encompassing not only the big city but also more extensive peri-urban areas. It commonly includes growing towns and small cities that coalesce, residential developments or suburbs, and farmland and woodland with invading houses. Valuable land is lost. Resources that the population has depended on degrade or disappear.

Quite fortunately and unexpectedly, a land mosaic paradigm founded on the theory of landscape ecology and allied fields has emerged, providing arguably the most promising basis for understanding and planning these large urban areas.[1] For two decades the principles have been increasingly applied to forestry, biological conservation and landscape architecture, and more recently, to transportation and wildlife management.[2] Yet landscape ecology is ideal for use in planning the urban region.[1, 2] Consider some of its attributes:

- Applies well to any landscape or region, whether dominated by natural processes or human activities.
- Elucidates the structure (spatial pattern), functioning (flows/movements across it), and change (of pattern over time) of a landscape, as for any living system.
- Uses a simple patch-corridor-matrix model to understand a landscape composed of only these three spatial types.
- Uses a simple spatial language that enhances communication among academics, policymakers and the public, e.g., patches are large or small, rounded or lobed, etc., and corridors are wide or narrow, straight or curvy, etc.
- Provides a convenient handle, i.e., changing spatial pattern, for planners and policymakers to create landscapes that work better and can be sustained (Figure 1).
- Is now based on a considerable and rapidly growing literature of articles, texts and applications.[1,2]

1



Urban regions, compared with other landscapes and regions, typically exhibit their own distinctive range of spatial attributes.[3, 4] Consider the following: (a) originated next to a water body and good agricultural soil; (b) a major concentrated population (big city) in or near the center;

(c) marked heterogeneity (geomorphic and/or built) adjoining the city on different sides; (d) a network of major radial- and ring-transportation routes that encloses fine-scale road networks; (e) scattered large open-space (unbuilt) patches in a highly heterogeneous matrix dotted with "bits of nature"; (f) a few major green corridors and many narrow short disconnected ones; (g) remnant farmlands, a few large ones usually still intact; (h) expanding towns and small cities coalescing or nearly so; (i) scattered developments and houses in the outer portion of the region; and (j) hard-surface cover extensive in the city and patchy in peri-urban areas, causing major effects on flooding and stream degradation. These and other unusual characteristics of urban regions, when combined with clear principles, provide a spatial and functional basis to plan and create much-improved land mosaics.

However, society must answer some questions and outline the objectives for an urban region. For example, is agriculture important today or for the future in an urban region (or could it be eliminated and food imported from other landscapes)? Are unpolluted aquifers and clean surface water important? Should flood hazard be reduced? Is biological diversity, especially rare species and rare habitats, significant here? Is it important to provide ample opportunities for hiking and other nature-based recreation? Should population growth be focused on areas with minimal environmental impact? Should road systems be designed to control both traffic congestion and environmental degradation? Is flexibility and stability for the future important? If the answers are "no", these attributes and resources may still be provided elsewhere. Yet that is a greater cost to the region as well as a greater impact on other landscapes. However, if the answers are "yes", all can be accomplished in an urban land mosaic for the future.

No urban region has achieved the preceding attributes or has even attempted to plan for them.[3, 4] Planning and creating such a land mosaic remains a challenge, yet accomplishable. Indeed, consider the following urban regions that have addressed one or more of the attributes. The examples focus on large natural-vegetation patches or areas, on major vegetation corridors (that are relatively wide), and on walking trails, because these serve as useful surrogates for a number of the preceding attributes.

2

A. Patch-and-corridor system for the San Diego, California region[5] (Figure 2). In essence, the environmental community, developers, and government (local, state and federal) agreed that protecting this large-patch-and-major-corridor system of vegetation would achieve two major objectives: protection of the bulk of biological diversity; and facilitation of development outside the protected system (an area outside the system could later be protected if government paid the developer for it). Water supply and recreation are secondary benefits. About two-thirds of the system has been protected so far.

B. Skyline greenbelt of the Seoul, Korea region[6] (Im 1992). A few-kilometer-wide vegetation strip on rolling hills and mountains almost completely surrounds Seoul (as well as several other Korean cities). The greenbelt is based on visual, cultural and ecological resources. Cultural resources include places of historic events and legends, as well as castle gates, walls and historic buildings. Ecological resources include groundwater protection, flood and erosion control, and protection of forests and plants. Visual quality is especially important. The skyline as the meeting boundary between sky and earth provides three key values: (1) wayfinding, whereby landmark objects fit into the longer skyline which provides legibility for where people live and want to go; (2) meaning, whereby the shape of a skyline evokes feelings such as serenity, primitiveness, the flow of time, or simply belonging; and (3) preference, which may include beauty, naturalness, rhythm, or appeal due to a single tall structure.

C. Planned radii-and-concentric-rings transportation network of the

Curitiba, Brasil region. High-density mixed-use development along radial transport corridors leading to five satellite cities has helped limit center-city size and provided for high public-transport usage. In addition, an unusually large amount of parkland is present, including wedges that reach to center city between radii. Thus a high proportion of the people live near relatively extensive parkland with nature.

D. Growth boundary of the Portland, Oregon, USA region.[4] An outer boundary was established largely to protect a surrounding rich agricultural landscape and to encourage more concentrated development and the use of public transport. On balance, natural systems benefited as well. Development can expand outward only at a very slow rate. This state-wide initiative, which included all municipalities of the region, established a trajectory, such that over time the Portland region has become increasingly distinct from other North American urban regions.

E. Large forest patches in and around German cities (Figure 3). Although current land uses may have changed, the patterns portrayed emphasize that a particular forest provides diverse values that meet a few, or many, of society's major objectives.

F. Other urban regions in brief. Canberra, Australia is a planned city with a central downtown and seven distinct residential towns separated by adjacent farmland and forest. In the USA three patterns are illustrative: (1) Denver with a network of trails that mostly connect small parks; (2) Minneapolis with a nearly completed 40-mile (65-km) network of greenways (wide corridors) and trails mostly connecting to lake shores and small parks; and (3) San Francisco with dispersed large natural-vegetation areas and relatively few interconnecting trails. Ottawa (Canada) has a few-kilometer-wide greenbelt of diverse land uses around half of the city, plus a finer-scale network of greenways penetrating portions of the urban region.

Finally, consider the Greater Barcelona Region in Spain.[7] A remarkable range of valuable attributes remains, around which a wonderful land mosaic for the future could be planned and created. These include large protected natural-vegetation parks, large agricultural landscapes for food and wine, some protected stream corridors, essentially no strip development, sprawl of towns but limited sprawl of houses outside towns, a strong regional (Catalan) culture, a sense of community in localities, an appealing livable people-oriented major city, and a ("can-do") tradition of visionary thinking and accomplishing projects.

A landscape ecological perspective, combined with some principles from transportation, water resources and other fields, could effectively tie these building blocks together with other major spatial and functional attributes. For example, reasonable answers to previously difficult questions are now available. How many large natural-vegetation patches are needed and in what arrangement? How can the range of connection types be fit to these large patches? Which stream corridors in what form and for what benefits are most important for protection? Where should growth be appropriately focused to also maintain valuable natural systems? How can more clean water be provided while also reducing flood hazard? How can towns concurrently provide for future growth, neighborhood enhancement, limited traffic, and more nature? Such questions have spatial solutions that can fit together in a land mosaic for the future of the Greater Barcelona Region.

To conclude, the urban region is the last great land type on earth that has yet to be analyzed…and then planned and arranged…as a land mosaic for the future. So much of the world's human population is now concentrating in urban regions that a solution here has cosmic importance. A spatial arrangement, where both nature and people thrive, is the challenge before us.

Which urban region will grasp the opportunity to lead, and thus become the model that all others will have to examine and follow?

The author is pleased to thank Marià Martí and Teresa Pastor of Fedenatur, and leaders of the Consorci del Parc de Collserola and the Diputació de Barcelona, and the Mancomunitat de Municipis de l'Àrea Metropolitana de Barcelona.

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Mascaró, Josep

Architect at the Higher Technical School of Architecture of Barcelona (1969). He has worked in territorial subjects and in landscape architecture in Latin America and Spain since 1978. Since 1988 he is the architect in charge of Projects and Works of the del Park of Collserola. He has also been working as a ladscape teacher at the University of Barcelona.

Technical visit to the metropolitan area of Barcelona

On the first day of the Symposium a technical visit was programmed so that the participants who so wished were able to view part of the territory of the conurbation of Barcelona which surrounds the Collserola mountain range. This visit had a triple aim:
First of all, to obtain a real panoramic vision of an important part of the metropolitan territory of Barcelona, as well as to give an explanation about the projects and operations in course. Secondly, as this visit was made from different areas of Collserola Park (figure 1), advantage was taken of this in order to show some areas of the park. Finally, this trip helped to create a useful and agreeable relationship between the participants for the rest of the days of the Symposium.

The areas visited were the following:

Valley and Delta of the Llobregat. (figures 2, 3,4)

From the mountain of Sant Pere Màrtir, located in the southern part of Collserola, an excellent panoramic view can be seen of part of the valley and delta of the Llobregat River. The elements to highlight are the following:

- Delta Plan
  Diversion and conditioning of the Llobregat River.
  Extension of the port and new area for logistic activities.
  Llobregat waste water treatment plant.
  Extension of the airport.
  Environmental management and creation of wetlands.
  Road and rail infrastructures.
  Promotion of industrial estates and logistic activities.

- Special Plan of the Agrarian Park
  Preservation of the agrarian area of Low Valley and the Delta.
  Viable exploitation within the framework of sustainable agriculture.
  Connectivity with the immediate environment and at the metropolitan area level.

- Project-framework for the environmental recovery of the fluvial space of the Llobregat River in the Baix Llobregat county.
  Recovery as a natural space of all the riverbanks and the fluvial system of the river and creation of a space for leisure activities for the public.
  The area covers 50 km. From the bridge of the Montserrat cable car to the sea.
  Treatment of the territorial corridor with special emphasis on the connections with the streams which run down from the mountain ranges of Collserola and Ordal.
  Relationship Collserola-Ordal-Garraf.

Vallès Depression. (figure 5)

In order to have a good view of part of this county we climbed the Puig de la Guardia, on the northeast side of the park. From this vantage point the view reaches the pre-coastal chain (Montserrat, Sant Llorenç de Munt and Montseny) as well as the towns in the Valles. The following characteristics of the territory are observed and explained:

- High demographic growth.
- Transformation of the rural landscape into urban and industrial landscape.
- Progressive reduction in potential corridors, between the coastal and pre-coastal mountain systems, due to the passage of road infrastructures and the diffuse model of urban growth.
- Growing tendency to locate tertiary activities and industries with low added value.
- Location of large facilities and metropolitan amenities
- Extensive urbanisation models (Valldoreix, Mirasol, Bellaterra, Cerdanyola del Vallès).

Montcada, the narrow pass of the river Besòs and the new sea front. (figures 6, 7, 8, 9)

In order to observe this complex territory so densely occupied by infrastructures, a visit was made to the vantage point of Singuerlin, in Santa Coloma de Gramenet, now outside the limits of Collserola Park. The elements viewed, as well as the trends which can be seen are the following:

Great increase in the urban and industrial fabric of Montcada i Reixac.
Complexity of the connection Collserola -Turó de Montcada -Besòs river- Serralada de Marina.
Need to conserve the inter-urban rural spaces.

- Environmental recovery of the final stretch of the Besòs River.
  - Improving the hydrological capacity.
  - Creation of wetlands in order to improve the water quality.
  - Recovery of the river course areas for citizens' leisure.
  - Naturalisation of the final stretch (mouth of the river).

- New sea front. Universal Forum of Cultures Barcelona 2004.
  - Actions aimed at the environmental regeneration of the sector, such as the recovery of the coastline and the course of the Besòs river (wetlands, mires, rocks).
  - Amenities like the marine zoo, new marina, bathing areas, urban coastline park.
  - Commercial and hotel activities.
  - Extension of Diagonal Avenue.
  - New urban developments.

Reflections from the visit with regard to Collserola Park.

The metropolitan region has suffered a basic modification in its structure over the last three decades. While the demographic forecasts have been lower, residential and industrial land has practically doubled over the last 30 years and communications infrastructures have clearly increased. This has been so mainly because of the implantation of urban models which consume large areas of territory without an efficient and competitive public transport system having been articulated.

This reality has negative consequences, both for the consumption of territory in absolute values as well as for its fragmentation, even in those spaces which already have protection measures, as is the case, among others, of Collserola Park. (figure 10, view from Barcelona; figure 11, view from Sant Cugat del Vallès 11)

Therefore the protection strategy for natural and rural spaces in the whole of the metropolitan territory must be approached as a great project which covers all the parts, on a regional scale, throughout a system of free spaces, by means of which a network of protected natural and rural spaces is created, distributed throughout the pre-coastal and coastal mountain ranges and in the Vallès - Penedès depression itself, in such a way that its functioning as a continuous system is guaranteed and so as to avoid "islands", which are so negative from the point of view of the conservation of their natural systems and the maintenance of their biodiversity.

In this strategy, Collserola Park, with a surface area of 8,450 ha and located right at the heart of the metropolitan area of Barcelona, plays a central role. Certainly, its geographical, environmental and heritage characteristics give it the role of the hinge of the region. Also, its considerable extension and its contact with the new towns which surround it make it essential for the citizens' leisure. In fact, the large aims of the Special Plan for the Organisation and Protection of the Natural Environment of the Collserola Park, approved in 1987, are the following: To formalise the metropolitan city; preserve the biological diversity and maintain the stability of the natural systems; preserve the cultural and landscape heritage and offer new opportunities for leisure.

This peri-urban, metropolitan park has in isolation and fragmentation, one of the most lethal actions for its biological diversity. The isolation of the animal and plant populations must be prevented at all costs as this would, without doubt, impoverish the natural space and the environmental and social benefits which stem from it.

It is therefore necessary for the models of occupation of the territory within the metropolitan region to bear this phenomenon in mind and to guarantee the genetic flow, connectivity and survival of species by means of the design of the limits of the free spaces which make up a continuous functional system. (figure 12).

Celecia, John Félix

He is one of the members of the founding team of the International Secretariat of the Intergovernmental Programme on Man and the Biosphere (MAB) of the UNESCO, which he continues collaborating with actively. He studied agronomy at the University of Buenos Aires and did an MA and PhD at the University of Georgia (USA). In Argentina he worked at the University of Buenos Aires, at the Ministry of Agriculture, at the Land Institute and National Institute of Farming Technology (INTA). In the United States he was a professor, researcher and director higher categories at the Universities of Georgia and North Carolina and other higher education institutions. Since 1973 until 1995, he acted as Principal Specialist and Officer of Projects, promoted to Director in the last period of his career, in the Direction of Ecological Sciences of the UNESCO in Paris. He is a founder member of FEDENATUR and a Member of the Higher International Board of the Latin American Federation of Environmental Sciences and Permanent Professor of the UNESCO/FLACAM Professorship for Sustainable Development.

Martí, Marià

Doctor in Biology in 1979 at the Autonomous University of Barcelona. Since 1993 he has been the Managing Director of the Collserola Park Consortium (a metropolitan natural space of 8,470 Ha.). He was Director of the 2nd Symposium on Natural Spaces in Metropolitan Areas (Barcelona 1995) and promoter of the European Federation of Peri-Urban Natural Spaces (Fedenatur) of which he has been the General Secretary since its creation in 1997.

Summarising review and reflections based on the work presented at the III Symposium and presented as conclusions

Seventeen communications were presented containing case studies carried in different cities and metropolitan regions from around the world, which stand out for the way in which the territory is organized and for the management of their open spaces. The framework that was established highlighted three central areas in the debate:

The planning and management of open spaces, with several models and strategies of territorial management, as well as methodologies of land valorisation, land diagnosis, and analysis of achievements.

The environmental, social and economic benefits of the implementation of this type of network of open spaces.

Management and financing policies for Networks of Open Spaces. Under this heading, local, regional and national policies were presented, which were aimed at stimulating and financing the development of networks of open spaces, together with strategies for mediation between the different actors (users and special interest groups) involved in the management of open spaces.

The Symposium, which was attended by 300 people, was aimed at people involved in the management of urban and periurban natural spaces, technical and political representatives of cities at a local or regional level, people who are responsible for urban planning at an institutional or professional level, and technicians and professionals linked to the study and management of land and natural and landscape resources.

We group a series of reflections, drawn from all the experiences that were put forward, into the following sections:

A- COMPLEXITY AND UNCERTAINTY

The territorial aspect of the Symposium brings the different actors face to face with the uncertainty that characterizes the enormous complexity of interactive and interdependent systems, in which chaotic behaviour is dominant.

When tackling the problems of the relationships between cities and their "natural and rural" surroundings, we must adopt the precautionary principle. This is especially true when we try to compare the different approaches that are applied to planning, management and decision making with regard to the cities themselves, to the process of urbanization, the territory and the changes and transformations that have taken place within it, its natural resources, agricultural productivity and the conservation and protection of nature.

This complexity is increased by the complexity and the variability of the interfaces in the natural/rural environment (ecotones, wetlands, costal areas, etc.) and of the urban organization (periurban, rurban [or rururban], suburban, etc.).

B- SCALES AND DIMENSIONS

A review of the papers presented at the III Symposium immediately draws the attention to the great differences in scales and dimensions used in the different presentations.

In this respect, and as far as the case studies which represent very different bioclimatic and biogeographic situations are concerned, there are essentially three dimensions that we consider in the analysis of land planning and territorial management:

- The spatial dimension:

This becomes very evident in the range of the cases presented. So, in the European case it is necessary to consider a 'continent' which is relatively small as such, with a large number of countries, a long history of human occupation, and a very high density of urban, periurban and industrial systems. This is true to such an extent that Europe can be considered as a vast network of cities and other human settlements, with rural and 'natural' spaces of varying sizes in between them.

Surprisingly, it is not the presence of 'megacities' that singles out Europe. The metropolitan conurbations of Paris, London, Moscow, and the Ruhr Valley, are all of remarkable size, but of the 23 urban giants in the world, only three are located in the industrialized world (New York, Los Angeles and Tokyo) and the others are all in the developing world, particularly in Latin America and Asia.

Europe and other industrialized regions can be considered to be in a “comfortable”, situation, given that they have not experienced the brutal growth of megacities, which accompany the demographic growth and migratory phenomena that have been characteristic of other continents. In industrialized countries, urban and periurban problems, including the relationship between cities and their surroundings, have their origins, among other things, in:

- The inertia of the application of models of settlement and development that correspond to obsolete ideas.
- Deficiencies and errors in planning and management.
- Speculative phenomena, caused in numerous cases by excessive speculation
  negligence with regards to human aspects, on the part of those responsible for planning and management
- A lack of will and resolve on the part of those responsible for setting policy and decision making.
- Indifference and a lack of regard for the natural values on which they depend.
- The vast impact that results from the demands that the urban areas make on their surroundings, both near and far, which have now become global.

- The temporal dimension

In terms of human occupation and the history of humanity, there exists a great contrast. Europe, with a human presence and occupation (in addition to the development of cities) which stretches back twelve millennia in the South, contrasts drastically with the New World, for example, in which the identity of the most modern nations has been defined, in some cases, in little more or less than two centuries. Latin America in particular now has a rate of urbanization which nearly reaches that of industrialized countries and since the start of the second half of the twentieth century, this has been accompanied by the accelerated growth of megalopolises (e.g. Mexico City, Sao Paulo, Buenos Aires, Rio de Janeiro, etc.) whose populations are as large as some European countries. It is also worthwhile pointing out that the United States of America is the nation that has the highest demographic rate of increase of all the industrialized countries.

Since the "industrial revolution" there has been unprecedented urban development, accompanied by demographic growth and industrialization, together with drastic increases in the use of extrasomatic energy and the demands made on natural resources.

- The dimension of perception

This consists of all those factors and processes that are intangible, difficult to qualify and sometimes more difficult to quantify, associated with the human population. All too often they are not taken into account by those who are responsible for making decisions that are related to planning. Perception includes the vast range of social, cultural, economic and socio-political characteristics

of the human component associated with conditions and lifestyle. That is why it is so very important to have better knowledge available and to gain increased understanding of the factors that affect the human population in terms of social values, cultural makeup, perceptions of dominant conditions of life, identification and relationship with nature, family cohesion, social relationships, demographic pressure, job and community satisfaction, recreational opportunities, entertainment, diversion or leisure. All of these are factors that are related to education and the level of awareness, together with the participation of the public in activities of common interest.

In general, and up until recently, territorial planning has been undertaken by different sectors, without a sufficiently interdisciplinary approach and without enough cooperation between the different sectors. Human and environmental dimensions have been ignored and this has led to a tendency of exaggerating achievements and merits while rarely revealing the failures, mistakes and shortcomings of the models that are used. The lack of consultation with local communities has been particularly notorious, and has led to communities having to accept projects and their consequences de facto.

The work presented at this III Symposium, has shown that progress has begun on focusing professional attitudes towards the territorial dimension of environmental and human aspects. In this sense, counting on the participation of the population and its many different organizational aspects has proved to be a hugely important factor.

The landscape is an outstanding element in the perceptive dimension. The creation, description and interpretation of the landscape, cannot be subject only to professional means, but rather to representations and interpretations on the basis of criteria which are historical, nationalist or regional, functionalist, productivist, cultural or national identity, etc. Hence, the evaluation of a landscape can respond to national, cultural and historical factors, obviously in addition to parameters which are biotic, abiotic, physiognomic, geomorphological and hydromorphological, etc., which form part of formal studies such as the ecology of the landscape. So, the landscape in an evolutionary, dynamic and historical context represents the blend of nature, culture and society. The deterioration or destruction of a landscape, or even changes or transformations brought about in it, can pose a threat to the social and cultural identification of the inhabitants of that landscape. The older the landscape is, the more important its identity.

In this way, in an "old" continent such as Europe, what we identify as 'nature' in many cases is in reality, an anthropogenic landscape which can be measured in centuries or in millennia.

The wealth and fragility of "nature" in the Mediterranean basin is a mosaic of landscapes with many thousands of years and hundreds of generations behind it. The examples presented of systems with a Mediterranean-type climate in different regions of the world, showed that they are some of the richest areas for life (with the greatest biological and genetic diversity) with the corresponding cultural wealth. They gave rise to the integration of human settlements into the structure of the landscape and ecosystems in general.

It proves to be very difficult to conserve an entire system of open spaces in general from the perspective of the protection of individual spaces, or even from that of the protection of networks of spaces, given that most of the system dynamics depend very closely on the makeup of the whole system. Consequently, successful organisation of the territory has to start from the point of view of the whole territory as a single system, in which all the free spaces play a key role, and all must be suitably planned and managed.

C- THE URBAN PHENOMENON: NOTABLE ECOLOGICAL ASPECTS

During the period of the rise of urban growth (also called urban explosion) and the multiplication of megacities, UNESCO's Man and the Biosphere (MAB) Programme, launched in 1971, established the first international research, training and promotion initiative to consider cities – which at present house more than half of the world's population – as ecological systems.

This is how we became aware that, in addition to the characteristics that urban ecosystems have in common with other ecosystems, they house a high production of information, knowledge, ideas, creativity, culture, industry, and science and technology, among other things, which benefit the human population. But they also show characteristics which, taken as a whole and given that it is predominantly planned, organized and managed, shape it as an open system, particularly due to the heavy dependence and impact they have on other systems. That is the way the relationship between the city and its surroundings ("hinterlands") becomes an essentially worrying subject, particularly, as far as the reasons behind this symposium are concerned, due to the high demands placed on territory, land and resources.

As mentioned above, as a consequence of the enormous demands that cities place on the other systems they depend on (not only

in terms of energy and materials but also in terms of space for collecting and treating their waste) we realised the importance of considering the "far-reaching roots" of urban, periurban and industrial systems today called "ecological footprints" and their impact on an unprecedented scale in human experience and which can be considered in the context of globalisation.

D- BIOLOGICAL DIVERSITY (BIODIVERSITY), OF ECOSYSTEMS AND LANDSCAPES

The awareness of the importance of biological diversity, closely related to diversity of biotopes, ecosystems and landscapes, and also to human well-being, led to the Biodiversity Convention, as one of the most important points of the Rio de Janeiro UNCED in 1992. It has become obvious that the conservation and protection of biological diversity are essential factors in strategies that are aimed at the rational and sustainable use of natural resources, and they are deeply intertwined with the concept of sustainable (or lasting) development aimed at the well-being of the human population.

However, the pressure exercised by the human population and its activities modifies and fragments ecosystems at an ever accelerating rate, which leads to an acceleration in the extinction of species which is unprecedented in the history of humanity. Genetic potential is also being reduced at an alarming rate. In this respect, the model of cities and the very fabric of metropolitan areas takes on an important role. We should remember that protected areas (islands marked out on the territory) do not, in themselves, meet our conservation needs. An important part of the biological diversity is to be found outside the protected areas, in natural and semi-natural areas and in systems which are subject to different degrees of human intervention, including extensive and intensive farming systems, land for crops and fallow land, areas for grazing, forestry exploitations and of course, in urban, periurban and industrial (and also rururban) systems.

E- SUSTAINABILITY

In a more descriptive way, sustainability implies that in strategies for economic development, any action which may threaten future well-being should be accompanied by present compensations for future generations. The literature on the theme suggests that the capital which we leave to future generations should be equal to or greater than the capital that we have available to us in the present. This capital should ensure the capacity to generate human well-being, and offer the necessary means to achieve it. By «capital» we are to understand not just the capital generated by human beings themselves, but also knowledge and skills (human capital), together with natural capital including, among other things, energy resources, biological and genetic diversity, the diversity of ecosystems and landscapes, clean and uncontaminated air and water and a habitat which respects the environment. In this sense, cities and their models for growth cannot escape a commitment to the principles of sustainability which should reach into all facets of social development. A system of human development which is not sustainable is, in principle, a selfish and perverse system as it does not consider the effects and impact (which very often are irreversible) that its demands have on other systems and their inhabitants, not just those in its immediate surroundings but also in other parts in the world. Even if it is possible to reverse environmental impact and to rehabilitate, recover or restore the affected system (even if only partially) this is done at an immense human and economic cost which has a particularly large effect on the human population concerned.

FROM THE EXPERIENCES AND MODELS PUT FORWARD THROUGHOUT THE 3 DAYS, WE HAVE DRAWN THE FOLLOWING CONCLUSIONS:

- Balanced urban development which takes into account the population and its welfare needs must include the availability of natural and/or rural open spaces as a feature to be enjoyed by the citizens, as an element of environmental quality, of quality of life, of psychological and social balance for the population, and of a commitment of the cities to maintaining biodiversity.

- Open spaces must not be seen as the leftovers from a model of territorial occupation or development of the urban system, but they must rather form one of the objectives of the territorial model, which must take account of the environmental value that the territory itself contains and must guarantee the viability of the territory as an ongoing system, in terms of supporting biotopes, ecosystems and viable areas for the dispersion of animal and plant species. The territorial configuration must allow the continuity of the landscape and guarantee genetic flow and therefore, the existence of effective biological corridors.

- Correctional and rebalancing actions must be considered for any environmental territorial dysfunctions such as fragmentation of the territory, which limits the interconnectedness of free spaces with an important landscape of biological entity.

- Initiatives for assigning and protecting protected spaces within metropolitan areas, should primarily be aimed at those spaces with intrinsic value which are most threatened and also where the interconnectedness of protected spaces can play an important role, with the objective of consolidating a continuous system. In this sense, as an example, work is being carried out to bring together the concepts and practice of Biosphere Reserves and urban, periurban and industrial systems. Europe has numerous examples of Biosphere Reserves in the areas around cities of varying sizes. In fact, the suggestion has been made that the denomination of Biosphere Reserve be extended to certain cities; an idea which is causing reflection and debate.

- Green urban areas must be conceptually incorporated into the framework of the system of free spaces and must contribute to maintaining the biological diversity of the urban environment. In this sense, it is desirable to establish a conceptual, functional, and if possible, physical connection with the natural periurban spaces.

- The fragmentation of the territory has been shown to be one of the actions which is most lethal to, and most threatens, biological diversity. The phenomena of metropolitanization of the territory, along with the creation of large infrastructures, play a decisive role in the isolation of animals and plant populations, reducing their size until they reach their viability threshold. This reduces the wealth of the natural spaces and the environmental and social benefits which are derived from them once and for all. For this reason it is absolutely essential that models of territorial occupation take into account this phenomenon and guarantee genetic flow, interconnectedness and the survival of species through the assignation of free spaces that constitute a functional continuous system.

- In this sense, the study of the biotic potential of the territory is highly important, as is determining the species with a high qualitative value which are threatened and, especially, those which have a role as bioindicators of the state of health and fragility of the ecosystems. These studies must be used to draw up the criteria for the protection and design of systems of free spaces. Bioindicator species constitute a unique tool for getting to know the state of equilibrium and the quality of ecosystems.

- The different experiences that metropolitan and periurban areas have of food production in family-based or cooperative agricultural and garden areas indicate that, apart from the value of the food itself (in terms of economics, employment, rehabilitation, and environmental education) there are other aspects associated with the management, conservation and involvement of the community. Such spaces can make an important contribution to the conservation of species, especially types and varieties of domesticated plants whose use has declined or which are in danger of extinction. What is more, it has been seen that within the framework of rational management of the urban/periurban/metropolitan territory, these spaces can make an effective contribution to the makeup of the landscape and to a focus on green spaces, not only with a social value, but also an economic value since they represent a landscape, more functional and social , which is less of a financial burden than conventional green spaces are.

- Many of the cities (and their surrounding regions) in which the industrial revolution developed, should realise that the relics of enormous infrastructures that are considered to be part of their heritage can be incorporated into plans for the transformation and restoration of areas with social, cultural and historical value in the same way as the landscapes which are identified as severely degraded or affected can be restored and recovered. However, the social impact and effect on the quality of life and human relationships that this massive industrialization has had on society and its repercussions must also be remembered.

- The experiences of members of the network show that it is not just the fragmentation of free spaces that is counterproductive and inefficient for conservation and management, but so too is the fragmentation of administrative structures and systems which, with the overlapping of responsibilities and powers, places limits on, and obstacles in the path of all the efforts that are made towards sustainable management and territorial cohesion. This can also be seen at a supranational level in regional and international organizations with multiple hierarchical divisions.

- It is very important to try to find synergies between cities that have built up considerable experience and valuable information, particularly throughout the last third of the twentieth century, and which actively continue to do so. This is the case of some of the cities and their participation in national and international initiatives for which there exist valuable studies of flora and fauna, along with biological studies, and studies of strategies aimed at conservation and management, training, environmental education, the participation of the local community, etc. The conceptual and effective evolution within the Biodiversity Convention, and the role played by different international governmental organizations and their action programmes, is increasingly contributing to such initiatives at a regional and international level.

The existence of networks, including FEDENATUR, makes it possible for cities that have acquired considerable experience in the preparation of their local "Agenda 21" to be able to offer help and assistance to those other cities which intend to establish their own Agendas.

- The experience that has been built up in many of the cases that have been studied, both within the FEDENATUR network itself and from other networks (e.g. the MAB Programme), points to a series of factors (which have been put together by several authors in the last decade) that have contributed to the evolution of the conservation of nature in the urban and periurban environment, including, among others: the growing areas of wasteland or barren territory, which are a result of the effects of industrial transition; the rapid development of environmental (ecology) movements, together with the activism of certain urban groups in making the cities greener again; the emergence of urban ecology as a field of scientific investigation and of concrete actions; the creation of pro urban wildlife organizations; the reduction of certain forms of pollution and an improvement in biotic conditions (e.g. non-smoking areas, pedestrian areas and areas where a toll has to be paid to gain access, measures designed to restrict automobile access and certain types of fuel); the growing recognition that the urban environment is a mosaic of ecological niches and "guilds" occupied by a great variety of species; a more understanding attitude on the part of planners, managers and local authorities; fiscal incentives and subsidies for promoting ecological processes, green urban spaces and the use of native flora; an increasing presence of groups, associations and societies of naturalists and both amateur and expert gardeners in urban and periurban areas; an increasing effort in environmental awareness and education –both formal and informal- which reaches a wide section of the local population, including environmental journalism; a greater willingness on the part of the local population to collectively claim their right to participate and to be able to confront and oppose companies and businesses that are highly motivated by speculation and opportunism, and which attempt to avoid all types of dialogue and coordination with the local population; the same groups and collectives of citizens exercising increased public pressure on those who have the power to make decisions.

- Finally, we would just like to say that it is necessary to mention the great boost that the II Symposium represented in 1995, at which excellent examples of research were also presented, and which led to the creation of FEDENATUR. Through the experiences put forward at this meeting, it has been shown that it is possible to continue along the same path so as to be able to extend the principles of sustainability and apply them to the metropolitan territories of a number of cities that are constantly growing. As specific experiences within the network grow and are accumulated together with the experience of interactions and connections with other networks, so the need to proceed towards operations of compilation, sorting, analysis and synthesis of the information generated through these experiences becomes more apparent, in order to make the most of the set of actions and of the acquisition of knowledge and therefore to be better able to direct the collective and collaborative work to be followed in the future.