

## The Cali Botanical Garden and the Conservation of Ecosystems in the Cali River basin, Cali, Colombia.

El Jardín Botánico de Cali y la Conservación de Ecosistemas en la cuenca del Río Cali.

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## Abstract

The Cali Botanical Garden, situated in the middle sector of the Cali river in the Municipality of Cali, Valle del Cauca, Colombia, is a private conservation effort which promotes the integration of nature conservation and development of human communities in its influence zone. The strategy recommended in this document is the conservation of ecosystems which is based on a philosophy of regional development, where the conservation of biological resources and the satisfaction of human community needs are inseparable. Since the beginning of operations two years ago, the Garden has been operating a conservation education program with adequate infrastructure which provides education and recreation opportunities for the school children of the city. Through a subsidized Green Pass the Garden provides students of low income sectors an enriched learning experience. An ecological restoration process is being advanced to increase the native vegetation cover in the degraded hillsides near Cali. As part of this project local community members are trained in the tree nursery of the Garden and their participation is basic in the tree planting and protection of forest resources in the watershed. An ecological park along the Cali river is being promoted with participation of the environmental committee of the Commune One and the botanical garden. Key words: restoration, community development, education, botanical gardens

### Conceptual Framework

The Ecosystem vision as basis for territorial environmental ordination.

The conservation of ecosystem programs is a pragmatic approximation to the regional development theme as it integrates three aspects of diversity:

The species level; the level of ecological communities and ecological processes, and, the level of human uses of the biological systems.

The protection of the animal and plant species of a region is one of the central goals of the ecosystem conservation programs. The complexity of interactions among tropical species is generally accepted. Each community poses a distinctive character which is larger than the sum of its component parts. The conservation of ecosystems considers the richness of species in a community as well as the peculiarities and singularities of the species found and the interactions among them which make up a wet tropical forest, a mangrove, a dry forest or a paramo.

These two levels sustain a third one, which is the level of the use of species and ecosystems by people. Neither the local communities nor the distant ones in urban centers can remove themselves of the ecosystem dynamics. The regional economies depend on the sound environmental management achieved and their quality and development options rely, ultimately, on the ways they administer their environment (Hamilton 2003). What unifies this ample spectrum of concern is the sensibility with which we may adapt to the changes which occurs in natural communities and in our commitment to manage and to anticipate change, without destroying the ecological integrity of the region.

At the regional level the challenges we have to FACE to advance in an appropriate way to conserve strategic ecosystems are great. On one side we must gather appropriate knowledge, which requires to augment the knowledge base at a biogeographical scale to create a sound base for planning purposes. At the same time, it is crucial to strengthen the local capacity of people (and decision makers) to manage the environment (Blanchflower 2003). But this is not possible unless the mechanisms of participation are improved, to generate an audience for consultation, dialogue and decision making. Likewise, it is required to mobilise the human, technical, political and financial resources to manage adequately the ecosystems identified and selected for action

### The Conservation of Ecosystems: A Unifying concept

The conservation of ecosystems is a philosophy of regional development. Its success can not be measured only by the protection of individual species in parks and reserves, or by the sustainable management of species and ecological processes harvested in oceans and over lands, but by the successful integration of elements in an interactive system in which the biological diversity and the ecological processes are maintained, the legitimate aspirations of the people are met and the knowledge of the interdependence of human and natural processes is advanced (Hedlund

1989).

The conservation of ecosystems unifies place and processes. Its first concern are the discrete natural ecosystems and the human communities, and the role they play in broader patterns which unite each region to the adjacent ones and to distant ecosystems and the national and global economies. But its special concerns are the processes through which the links are expressed: the flow of water in the watersheds of a region, the cycles of nutrients which help sustain the productive capacity of soils, the climatic patterns which maintain the reproductive, the regenerative and the dispersion processes which characterize ecological communities.

The level of decision taking at the local level

The local capacity to resolve problems and to manage the development process must frequently be improved. Since the people of a region is affected directly by change, they are natural agents for dialogue and consultation. The true development rarely begins with the assignment of new institutions or new authorities; instead, the local institutions must be recognized and strengthened and their leaders must be supported to become more effective. The conservation of ecosystems is oriented to assist processes based directly on the local cultures and traditional economies.

To build successfully on the basis of local traditions requires two steps: Firstly, to involve local traditions like cooperatives, local conservation groups, the traditional and the municipal authorities-and to empower them with information, financial and technical resources, and assistance and above all with the power of external encouragement. Secondly, to identify and to animate local leadership for conservation. This requires to support the roles of local leaders of local institutions and to provide access to education or professional contacts which may increase their efficiency on a local, regional or national level.

The ecosystem conservation assumes that the local needs-for income, food, materials and pure water-can to a great extent be satisfied with local systems and resources, once such "necessities" and "resources" are recognized as part of an interdependent system whose destinies are intertwined (Hamilton 2003). There exists a great variety of innovative methods which can help meet basic human needs. Described as regenerative or sustainable methodologies, these practices seek to apply lessons learned of the experiences in natural communities to design agricultural, animal husbandry and forestry practices. The traditional cultures of resource management and the scientific and technical knowledge may contribute in equal ways to generate uses of the land (and water) that may be profitable, competitive and sustainable.

The character of Ecosystem Programs

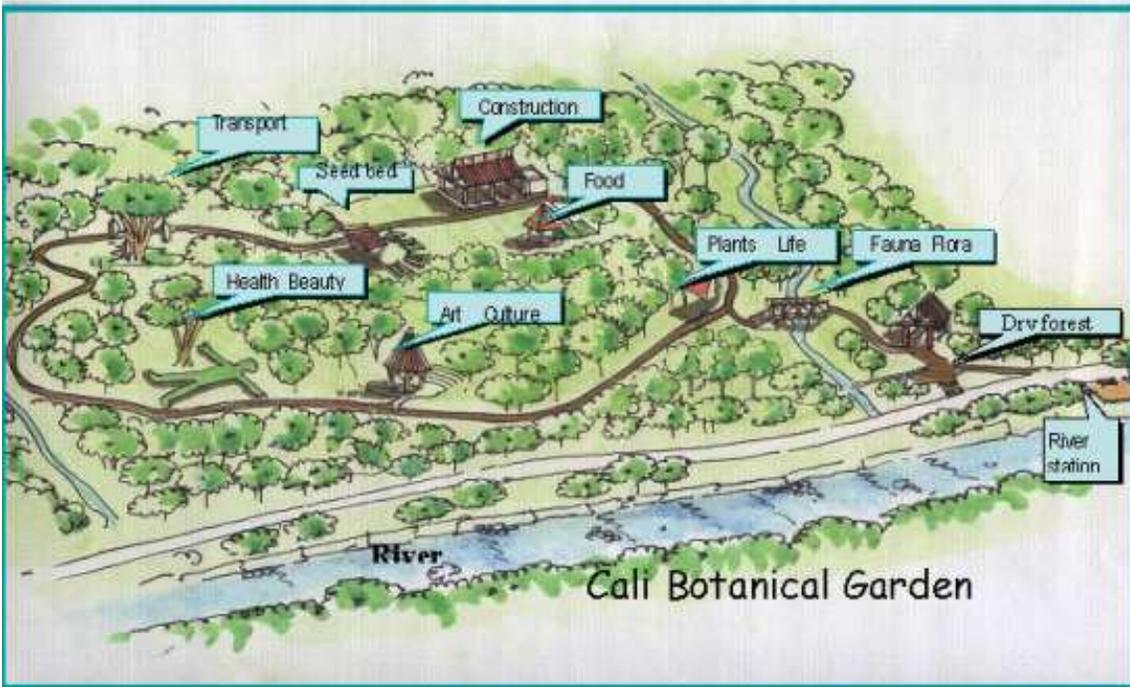
The Cali Botanical garden is advancing the following regional initiatives for the conservation of nature and the development of human communities in the framework of the ecosystem strategy:

In Education

-The Cali Botanical Garden: A place for education and conservation": This project develops an education infrastructure which allows it to receive its guests with the following features:

A nature trail and visitor center which incorporates forested areas, stream and open zones, all arranged for public use and enjoyment. Ten education stations located along the path, which highlight the importance of the tropical dry forests and the contributions of plants to the wellbeing of people. In each education station the visitor finds interpretive elements and cultivated plants which signal the ways plants provide material goods like construction materials, food, medicines, beauty treatments, and art and cultural elements (Echeverri 2004a, Orejuela 2003) (Figure 1.)

*Figure 1. Topographic map of the Cali Botanical Garden with the placement of the nature trail and education stations*



**Figure 1**

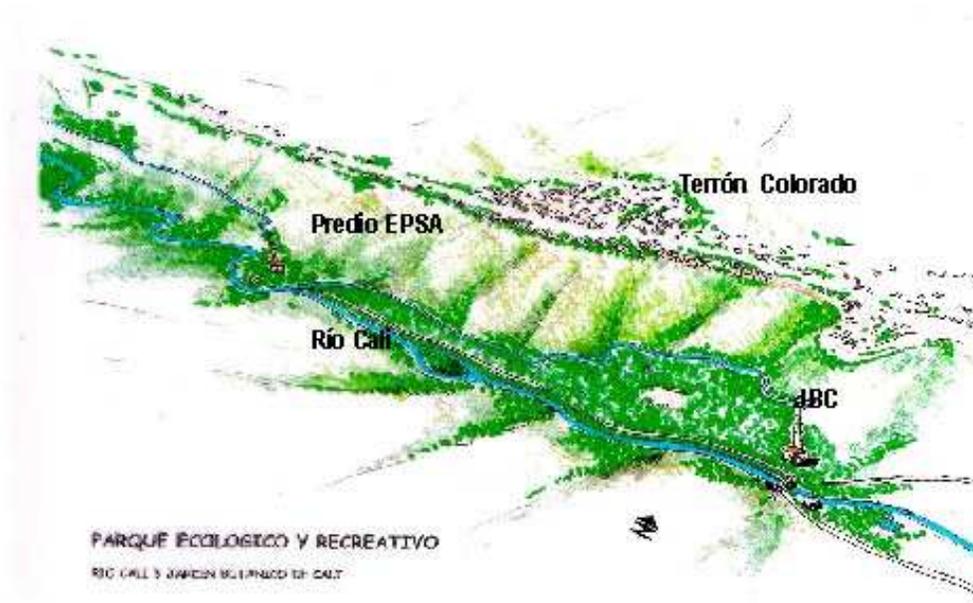
-A Green Pass to the Garden". Through special visits to the Garden, the students from schools of depressed and limited development sectors of the city, participate of the comfortable and rich environment of the Garden, where they broaden their daily experience with learning, recreational and ludic activities. At the garden they find a dynamic and practical complement to their classes at the time that they promote significant encounters with a rich natural environment.

In Conservation

-Establishment of an ecological and recreation park in the middle sector of the Cali river". This project which was submitted to the Cali municipality as part of the integrated ordination plan of the Cali river, will help to advance and protect a beautiful region of the city in the vicinity of the Botanical Garden as a public linear park. A work consortium of private, public and community organizations is being assembled to promote the social and environmental development in the Cali river basin. One of the main activities of the ecopark is the design and construction of passive recreation and education infrastructure like public baths, recycling and rubbish collection programs, camping sites, nature and health trails and decks for the observation of wildlife and scenery.

(Figure 2).

*Figure 2. Area proposed for environmental and cultural improvement in the Cali river basin.*



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Figure 2

-Recuperation and increase of native vegetation cover in the middle portion of the Cali River basin". This project promotes the preservation of 75 hectares of tropical dry forest and ecological restoration and natural regeneration of 150 hectares. The project was initiated with the training of local neighbours in themes like propagation of native species in nurseries, soil preparation and tree planting, management of ecological successions, prevention and attention of forest fires (Orejuela 2004). This project is permitting the CBG to acquire experience in restoration which will be applied to other situation in the Cali municipality and other places in the State like the Andean hillsides of interandean river valleys (Figure 3).

**Figure 3. Cali river in front of the Cali Botanical garden and Cali river Ecopark.**



**Figure 3**

#### In Research

With the participation of the Universidad Autónoma de Occidente several research projects are being advanced to know the elements of biodiversity of river and forest of the area and the socio-economic processes which affect the development of the region. Some of the projects advanced in the last two years are (Echeverri 2005):

- Ecological succession in plots affected by forest fires in the middle sector of the Cali river".
- Description of the vegetation of the Cali Botanical Garden, a vigorous regeneration of tropical dry forest"
- Foraging habits of the Harvester Ant *Atta cephalotes* in the tropical dry forest of the Cali Botanical Garden".
- Community ecology of the birds of the Cali Botanical Garden and neighbouring region".
- Inventory of the fishes of the Cali river basin with ecological notes".
- Characterization and repopulation of the native orchid species in the middle sector of the Cali river basin".
- Soil macroinvertebrates of the tropical dry forest of the Cali Botanical garden".
- Hydrological resources of the Cali river in the middle sector of the basin"
- Foraging behaviour and habitat use of two populations of Night Monkey *Aotus lemurinus* in the Cali Botanical garden, Comuna One of the Municipality of Cali".

Considerations about the role of the Botanical gardens working with difficult audiences

Botanical gardens are generally regarded as friendly, secure places, with adequate infrastructure for peaceful gatherings of communities. They are visited by many people who find in them recreational and educational opportunities. For these reasons among others, the Botanical Gardens become ideal places for the advancement of environmental culture and values associated with life in the cities. In the Gardens it is possible to promote through various methodologies and to different audiences the results of research and positive actions that people are doing that contributes to the improvement of city life

Perhaps the most remarkable aspect of the botanical garden community is its ability to adapt to local conditions. With a wide vision of opportunities and a diversified educational offer of actions and services, the Gardens can program themselves to work simultaneously as ecoparks, nature reserves, biological research stations, interactive educational centers, living museums and zoological parks, conservation of biodiversity theme parks, didactic units and environmental educational units.

In Colombia there exists an active and organized network of 25 gardens (Echeverri 2004b). The opportunities to establish strategic alliances are ample. A working example brings together several botanical gardens, universities and regional development corporations (environmental authorities) of the southwest with the purpose of providing technical support for the establishment and management of nature conservation and ecological restoration of the tropical dry ecosystem, one of the most severely diminished ecosystems of the country, and one of few protected areas. The consortium is advancing conservation in: Cali river basin: Jardn Botnico de Cali, Universidad Autnoma and CVC; El Ocaso forest: Botanical Garden of the Universidad del Quindo, CRQ; Bosque of Alejandra: Botanical Garden of the Universidad Tecnolgica de Pereira, CARDER; Bosque de Yotoco: Universidad Nacional de Colombia-sede Palmira/Bosque de Yotoco, Corporacin Autnoma Regional del Valle del Cauca-CVC; Bosque El Medio: Universidad del Valle; Bosques Pata River basin: Jardn Botnico Universidad del Cauca-Popayn, CRC;

Botanical Gardens can play a role as important as the national and provincial parks. Their ability to bring together private, public and community organizations make them ideal to lead conservation, education, recreation and cultural programs

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