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RESERVOIR AREA AND ECOLOGICAL PATHWAY AT SOUTH SCIENCES
AND HUMANITIES EDUCATIONAL CENTER (SSHEC) WITHIN THE
NATIONAL AUTONOMOUS UNIVERSITY OF MEXICO**

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RESUMEN. Este trabajo pretende contribuir a la conformación de una Estrategia Global para la Conservación de Orquídeas, a través de una experiencia concreta desarrollada en un Plantel Educativo ubicado al sur de una de las ciudades más grandes y pobladas del planeta, la Ciudad de México, proponiendo como elemento básico el rescate de las áreas verdes que están desaprovechadas y deterioradas y su uso para la conservación “in situ” de especies de orquídeas características del lugar. Este Plantel fue construido en la zona denominada “Pedregal de San Ángel”, producto del derrame de lava del volcán Xitle, misma que alberga a un ecosistema de matorral xerófito considerado único en el mundo, tanto por su diversidad como por su número de especies endémicas; en el mismo han sido reportadas 22 especies de orquídeas terrestres. Para el año 2000 este ecosistema se había reducido en más del 90%. El Plantel cuenta con 39,039 m² de áreas verdes, algunas de las cuales aún conservan especies características de este matorral. En el año 2000 se logró que al interior del mismo se decretara como área de Reserva Ecológica a una superficie de 2710 m² que estaba deteriorada; se rescató y se construyó un Sendero Ecológico y se han detectado, estudiado y protegido a 6 especies de orquídeas (*Bletia campanulata*, *Brachystele polyantha*, *Deiregyne pyramidalis*, *Dichromanthus aurantiacus*, *Habenaria novemfida* y *Sarcoglottis schaffneri*), e incluso se han introducido ejemplares de la especie *Malaxis myurus*, provenientes de rescates realizados en zonas aledañas, en los que se ha involucrado a profesores y alumnos del Plantel, obteniéndose excelentes resultados. Asimismo se han diseñado y aplicado Estrategias Didácticas para el conocimiento, valoración y conservación de estas especies de orquídeas.

KEY WORDS: conservation, education, orchids, pathway, recovery, reservoir

Antecedent

ZONE LOCATION.- One of the largest and populated cities on earth, Mexico City, has at present a small amount of trees and shows a green areas vanish annual rate of 3.7% (Ezcurra *et al.* 1990). Southward of this City, immerse in a zone known as “San Angel Stony Terrain”, and adjacent to University campus of the National Autonomous University of Mexico (NAUM), it is located South Sciences and Humanities Educational Center (SSHEC) subsidiary baccalaureate stream of the NAUM. Both the Educational Center and the University Campus, were built on the lava thrown out from Xitle volcano, which erupted approximately 2500 years ago render-

ing a worldwide unique ecosystem due to both its diversity and endemic species amount, besides its peculiar location in Nearctic and Neotropical confluence, and heterogeneous topography caused by lava solidification, thus producing an important microclimates and microhabitats mosaic (Rzedowski 1954, Alvarez *et al.* 1982, Rojo & Rodriguez 2002). In spite of the SSHEC is a typical urban environment, Educational Center become of great interest because it is immerse in a redoubt of this ecosystem and it is possible to find green areas that preserve characteristic species from it (Garduño *et al.* unpubl. 2003).

GENERAL ZONE DESCRIPTION.- “San Angel Stony Terrain” is a large mass of volcanic rock. Until 1950



FIGURE 1. *Senecio praecox*, typical species at San Angel stony terrain. Photograph by Cecilia Garduño.

it was an 80 km² area with different vegetal communities, in the lower parts the foremost community was *Senecionetum praecosis* (Rojo *et al.* 1994). This community is a xerophytic scrub characterized by woody species less than four meters tall, typical in semiarid environments, in which *Senecio praecox* or “palo loco” dominated until a short time ago; the community name is derived from this species (Fig. 1).

Originally, this community occupied 40 km², but during the last century it has been reduced to 1.47 km², due to factors such as Mexico City’s drastic growth, putting a great number of species in extinction danger (Soberon, Rosas & Jimenez, 1991). In spite of the aforesaid, this ecosystem still has an important biodiversity, although it has occur a dynamic change in species composition, it still maintain a high percentage (50 %) of the original components and a high total number of species, as well as endemics (Valiente & Luna, 1994).

At present this community is basically confined to the NAUM Ecological Reservoir area, occupying an

extent of 237.1 hectares, and here it has been reported 301 angiosperm species, grouped within 61 families (Valiente & Luna 1994), out of 22 species belong to Orchidaceae family (Tellez 2002). Likewise there are endemics examples such as cactus plant *Mamillaria sanangelensis* and orchid plant *Bletia urbana*, Dressler.

GENERAL DESCRIPTION OF EDUCATIONAL CENTER.- SSHEC is located the utmost southwest within the NAUM Ecological Reservoir area and it is built on a volcanic rock ground with slopes fluctuate between 15 and 40%, which means it is a difficult area to construct buildings and to set diverse kind of installations necessary to its performance. However, at present it has been widely constructed, remaining a small number of native vegetation areas that can be rescued. From a 99,242 m² total area (almost 10 hectares) only 39,039 m² (40%) correspond to green areas, at present these areas are very disturb. It must be noted that this Educational Center attends a broad community of students, professors, and administrative workers.

Purpose

The present article pretends to contribute to management and conservation of deteriorated native vegetation areas, through knowledge, rescue and “*in situ*” conservation of its species, particularly orchid ones, and development of an Environmental Education towards care and conservation of already mentioned species.

Development

In an effort to rescue and conserve native vegetation from this area and to promote “*in situ*” conservation of typical orchid species, after a diagnosis of the 32 green areas in Educational Center was accomplished (Garduño *et al.* unpubl. 1997), it was given a decree, in year 2000, by which a surface of 2710m² was declared as an Ecological Reservoir area, here it was carried out rescue tasks, and an Ecological Pathway was constructed and inaugurated on October, 2003 (Figs. 2 and 3). Parallel to this actions, a second diagnosis of green areas vegetation, in the Educational Center, was made (Garduño *et al.* unpubl. 2003), and present terrestrial orchid species were detected and identified (Garcia *et al.* unpubl. 2003). Likewise, starting from 2003 year to the present time, orchid species in Reservoir area and Ecological



FIGURE 2. Reservoir area before rescue. Photograph by Cecilia Garduño

Pathway of Educational Center has been detected, studied and protected, it has participated in rescue and reforestation labors of these species and it has been designed and applied didactic strategy in order to know, to appreciate, and to conserve such unique species.

Results and conclusions

As a result of the investigations related to orchids within the 32 green areas, it was found that in six areas exist seven out of 22 orchid species reported to San Angel stony terrain: *Bletia campanulata* La Llave & Lexarza, *Brachystele polyantha* Reichb. f, *Deiregyne pyramidalis* Lindl., *Dichromanthus aurantiacus* Lex., *Habenaria novemfida* Lindl., *Malaxis myurus* (Lindl.) O.Kuntze, y *Sarcoglottis schaffneri* Reichb. f. (Fig. 4, A-G). Most representative species was *D. pyramidalis* because it was found in five of these areas; followed by *S. schaffneri* y *B. polyantha*, found in three of these areas and *B. campanulata* found in two. In relation to species care and conservation, actions has been taken involving authorities and

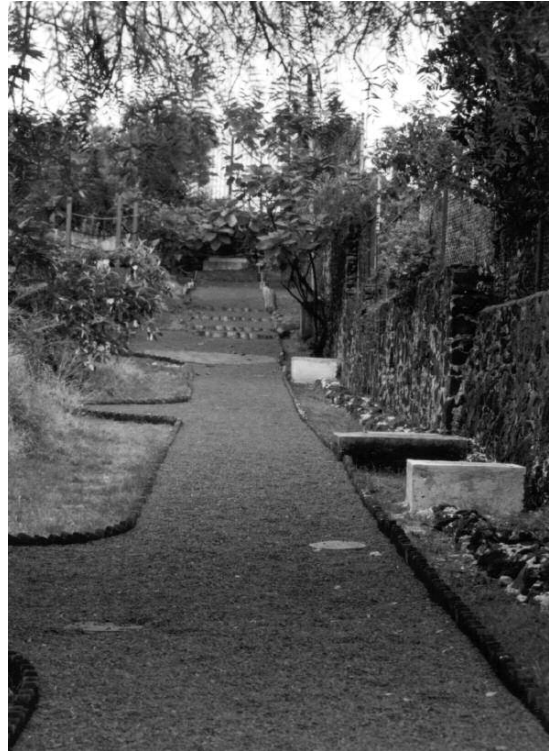


FIGURE 3. Reservoir area and ecological pathway after rescue. Photograph by Cecilia Garduño.

gardeners, from the Educational Center, in order to make them sensible about the importance of their participation, resulting in care and “*in situ*” conservation of these species (Fig. 5).

Within Ecological Reservoir and Ecological Pathway, it has been detected, studied and protected, the seven species already mentioned; however, plants of *M. myurus* were not originally found in these areas, those specimens come from rescue activities carried out at University Campus areas bordering Educational Center (Figs. 6, A-B), and were used as a part of reforestation at Ecological Pathway. Professors and students from Educational Center have participated in such activities obtaining excellent results (Fig 7).

Finally, supporting teaching activities of the Educational Center, Didactic Strategies has been designed and applied to professors and students, in order to know, to appreciate, and to conserve these orchid species (Fig.8). In sensible phase, such strategies include video analysis about stony Reservoir vegetation and

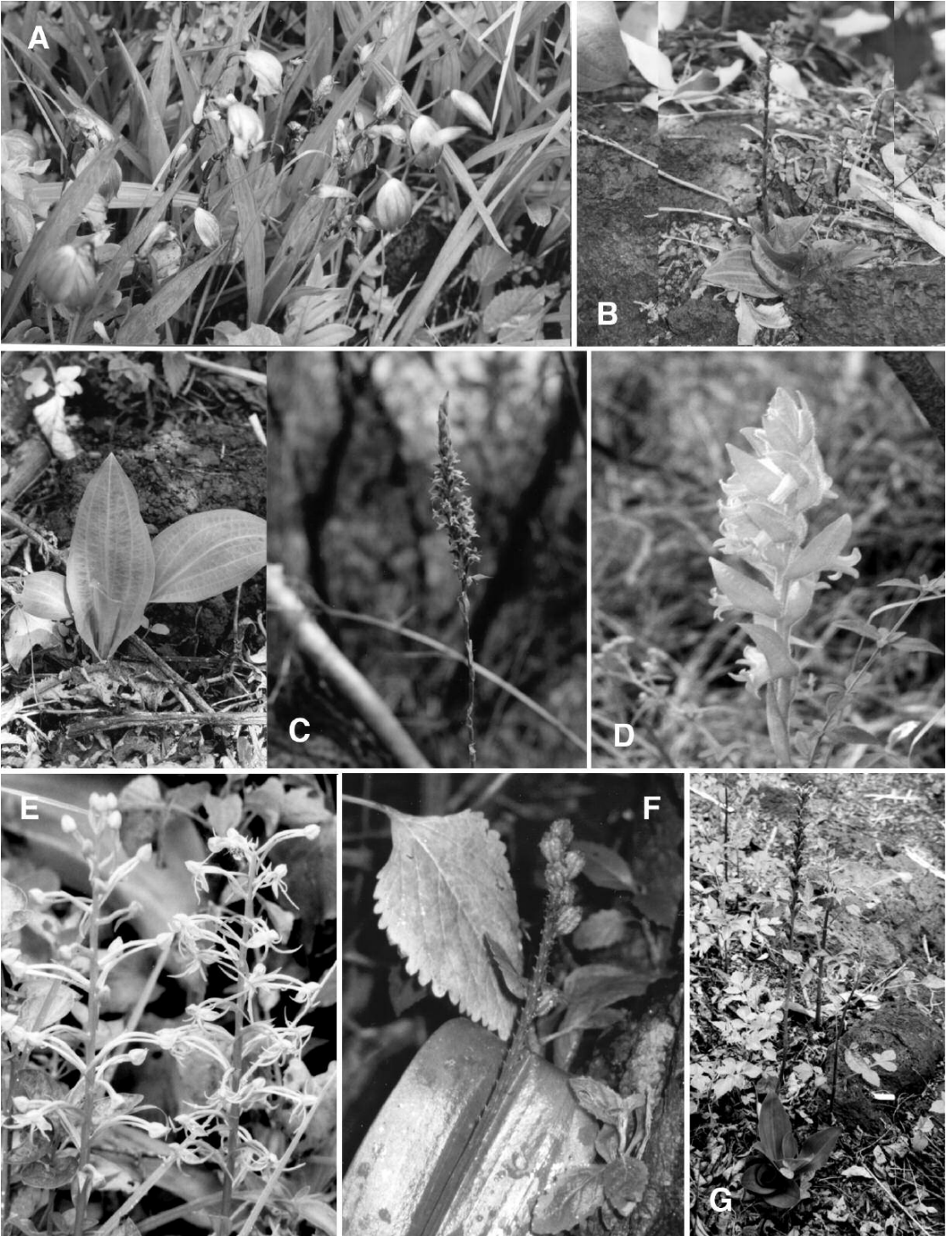


FIGURE 4. A - *Bletia campanulata* La Llave & Lexarza. B - *Brachystele polyantha* Reichb. f. C - *Deiregyne pyramidalis* Lindl. D - *Dichromanthus aurantiacus* Lex. E - *Habenaria novemfida* Lindl. F - *Malaxis myurus* (Lindl.) O.Kuntze. G - *Sarcoglottis schaffneri* Reichb. f. Photographs by Cecilia Garduño.



FIGURE 5. Gardeners working in care and “*in situ*” orchids conservation at Reservoir area.

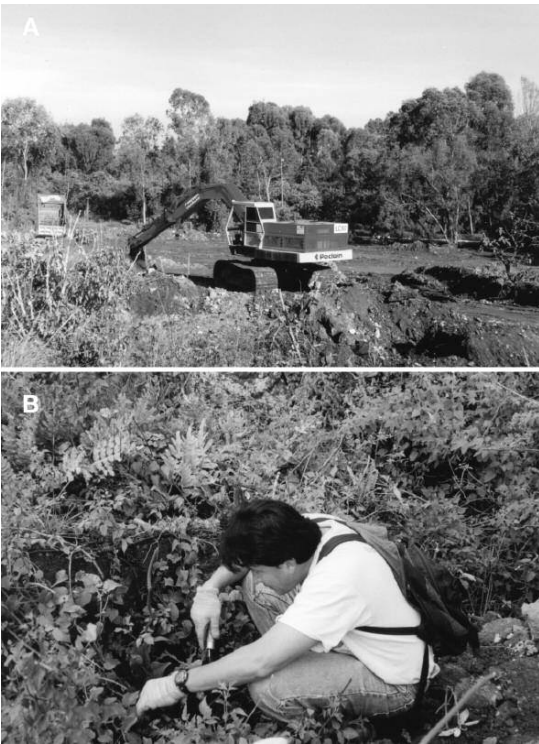


FIGURE 6. A - Green areas reduction at University Campus due to factors such as buildings drastic growth. B - Rescue activities at University Campus areas bordering Educational Center.

conferences about orchids generalities and stony terrain orchids and its importance; in development phase, Reservoir area and Ecological Pathway are examined in order to detect orchids; these activities are complemented with two laboratory experiments about orchids structures and adaptations and, to conclude, written reports about such activities are elaborated as well as group

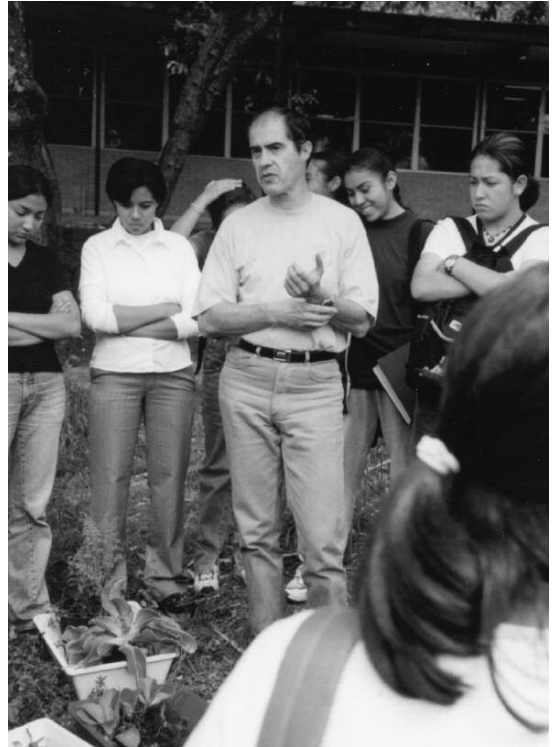


FIGURE 7. Professors and students have participated in reforestation activities at Reservoir area and ecological Pathway.



FIGURE 8. Didactic Strategies has been applied to professors and students, to appreciate and conserve orchid species

analysis and discussion of results.

According to results obtained it can be concluded that deteriorated green areas rescue and its further utilization as Ecological Reservoir areas, are excellent options both to promote knowledge and “*in situ*” conservation of orchid native species, as well as to foment development of an Environmental Education among the community.

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Cecilia Garduño was born in Mexico City and was educated at the National Autonomous University of Mexico (UNAM), where she received her Master in Sciences (Biology). She works as biology teacher at South Sciences and Humanities Educational Center within UNAM , 28 years ago, and she has been interested in Environmental Education, particularly in native orchids study and conservation . Among her works are the study and recovery of deteriorated green areas and its usage both as vegetable species Reservoir and Ecological Pathway in order to develop an Environmental Education. She has promoted Orchids Conservation “*in situ*”.

Sonia García is a founder teacher of South Sciences and Humanities Educational Center within National Autonomous University of Mexico (UNAM), where she works as biology teacher, 32 years ago. She studied a Master in Marine Sciences; later 10 years ago, she has been working to several Environmental Education and Orchids Conservation projects, particularly about characteristic orchids of “San Angel” rocky ground in Mexico City. She has promoted orchids conservation “*in situ*”, within Reserve Area and Ecological pathway.

Maricela Ramos is a biology teacher at South Sciences and Humanities Educational Center (SSHEC) within National Autonomous University of Mexico (UNAM), where she works as biology teacher, 31 years ago. She received her Master in Sciences (Biology) from UNAM and she has promoted Environmental Education in this High School Educational Center. She has been working to several projects about the study and conservation “*in situ*” of characteristic orchid species at “San Angel” stony terrain in Mexico D.F.

M. A. Aída Téllez was born in Mexico City and received her Master in Sciences (Biology) from National Autonomous University of Mexico (UNAM), where she works as researcher at Botanic Garden within Biology Institute and custodian of the National Collection Orchids, since 1985. She is particularly interested in the Mexican Orchids Conservation. She is also working to several projects about the study and characteristic orchids conservation at “San Angel” stony terrain, Mexico City. She has collaborated and advised to several “*in situ*” conservation orchids projects at Reserve area and Ecological pathway within South Sciences and Humanities Educational Center , UNAM.