

II.6 Higher Education, Environment and Sustainability in Latin America and the Caribbean

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Abstract

This paper describes the historical process and current status of environmental mainstreaming in higher education institutions (HEIs) in Latin America and the Caribbean (LAC).

By taking a historical perspective, this paper shows how the process has evolved in three stages over more than six decades. Over the course of this period, environmental higher education (HE) focused initially on natural resources, later on the environment and finally on sustainable development. Throughout this process, a very important role has been played by the promotional programmes of various international agencies, as well as the national environmental education policies of some of the region's countries. Nevertheless, credit for the achievements in the long process of greening HE belongs primarily to the universities themselves.

To describe the current situation of environmental HE in LAC, this paper will present some of the best-known experiences in the areas of training, research, outreach and environmental management at the region's universities. This overview will shed light on the great diversity of practices and approaches that Latin American HEIs have developed with regard to sustainability. However, the available knowledge about this complex process remains fragmented and superficial. To overcome these limitations, it is essential that the scientific community dedicated to studying environmental HE agree on and develop a common research programme.

EARLY STAGES OF ENVIRONMENTAL HIGHER EDUCATION IN LAC

The first stage in the process of greening HEIs was the emergence of technical and vocational training in the use of natural resources and the conservation of nature. At the international level, this process began in 1948 with a UNESCO-convened conference that resulted in the creation of the International Union for Conservation of Nature and Natural Resources (IUCN) and marked the first use of the term *environmental education*. The Education Committee set up by the IUCN in 1949 was the first entity to promote the incorporation of education for nature conservation in HEIs (UNESCO, UNEP and ICFES, 1988, p. 11).

The initial stage was dominated by the environmental education trends that Sauvé referred to as *naturalistic* and *conservationist or resourcist*. As its name implies, the naturalistic trend generally focused on the relationship with nature, but it comprised several different educational approaches, which emphasize 'learning *in* nature', 'learning *from* nature' and 'learning *about* nature'. The conservationist or resourcist trend, meanwhile, focused on the conservation of resources (Sauvé, 2004, pp. 1–4).

A recent study on the historical emergence and early stages of the development of environmental HE in Colombia (Sáenz, 2011a) showed that, starting in 1950, the country's universities began to offer the

first technical and vocational training programmes on the use and conservation of natural resources. In the 1950s and 1960s, a total of 26 academic programmes on environmental issues were created at 14 different Colombian HEIs.

Equal or greater advances could certainly be found if similar studies on this initial stage were to be carried out in other LAC countries, but at present very little is known about this stage in the region's process of environmental mainstreaming in HE.

The environmental education (EE) stage, as currently understood, began twenty years later, with a series of international events including the Biosphere Conference, held in Paris in 1968, and the United Nations Conference on the Human Environment, held in Stockholm in 1972.

LAC participated actively in all of the international meetings that took place in the 1970s and 1980s, including the International Seminar on Environmental Education in Belgrade (1975), the Intergovernmental Conference on Environmental Education in Tbilisi (1977) and the International Congress on Environmental Education and Training in Moscow (1987). In 1976, Bogota was the site of one of the regional meetings hosted by UNESCO and the United Nations Environment Programme (UNEP) as part of the International Environmental Education Programme in the run-up to the Tbilisi Conference.

Under the banner of 'Environmental Education in Latin America and the Caribbean', the 1976 meeting resulted in two important papers: a preliminary study of the region entitled 'Needs and Priorities in Environmental Education' (UNESCO, 1976) and a consultancy report entitled 'Overview of Trends and Activities' (De Teitelbaum, 1976). Both documents stressed the importance of EE at the HE level in the region, as compared to other levels and types of EE in general.

ENVIRONMENTAL HIGHER EDUCATION AND INTERNATIONAL ORGANIZATIONS IN LAC

Starting in 1976, many of the new developments of HEIs in the field of EE were the result of regional promotion by various international organizations. But the organizations that did the most to promote EE in LAC during that period were UNEP and the International Centre for Training in Environmental Sciences (CIFCA).

CIFCA was created in 1975 through an agreement between UNEP and the Spanish government. From the outset, its work focused on the promotion of EE at the HE level in Spanish-speaking countries. In 1977, CIFCA

published a study entitled 'Overview of Environmental Higher Education in Latin America', which marked the first attempt to catalogue the region's progress in environmental mainstreaming at HEIs and was therefore considered a significant milestone in the process.

After CIFCA was shut down in 1983, the task of cataloguing and promoting environmental HE in LAC fell to UNEP's Regional Office for Latin America and the Caribbean (ROLAC). This work intensified with the creation of the Coordinating Unit (UCORED) and the Environmental Training Network for Latin America and the Caribbean (RFA-LAC) in 1981 and 1982, respectively, which worked in close cooperation with CIFCA during their first two years of existence.

Proposals for the creation of networks of this sort in other regions of the world had been circulating for ten years, but LAC was the only region that actually managed to create an Environmental Training Network. The creation of the RFA-LAC was made possible by the interest and effort of numerous people and institutions dedicated to this goal (Sejenovich and Ángel, 1982).

The first activities of the RFA-LAC's Coordination Unit focused on the construction of the network (Sejenovich, 1981b). In several countries, environment-related government agencies were designated as focal points in the regional network, and national networks were set up to bring together different types of institutions, including universities. Their main task was to diagnose, plan and promote the development of environmental education and research in their respective countries and coordinate their actions with UCORED. Since its establishment in 1982, the Environmental Training Network primarily oriented its tasks towards the transformation of knowledge in university education in LAC (Leff, 2009, p. xvii).

One of the main objectives of UCORED was to determine the level of development achieved by environmental HE in the region. In 1984, it published 'Diagnosis of Environmental Mainstreaming in Higher Education in Latin America and the Caribbean', the results of which were presented at the first Seminar on Universities and the Environment in Latin America and the Caribbean, held in Bogota in late 1985.

The study found that, in general, universities in LAC were already carrying out many environmental activities as part of their teaching, research and outreach programmes (UNESCO, UNEP and ICFES, 1988, p. 22), but that the process of environmental mainstreaming in HE still faced serious obstacles in the region. Several of these obstacles arose from the traditional academic structure, which is ill-suited to meeting demands for changes in the epistemological approach

and organizational model at HEIs that would enable the incorporation of environmental aspects.

HIGHER EDUCATION FOR SUSTAINABLE DEVELOPMENT IN LAC

The third and current stage focuses on concepts such as *education for sustainable development*, *education for sustainability* and *education for sustainable societies*. This stage began with the United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992. Since then, according to Sauvé, promoters of the sustainable development proposition have advocated the reform of all education for these purposes, giving rise to the sustainability trend (Sauvé, 2004, p. 19).

In the current stage, the process of incorporating environmental and development-related issues into HE in LAC has accelerated considerably, as compared to the two earlier periods. Unfortunately, there have been no recent regional studies that would enable a comparison with the progress reports of the 1970s and 1980s. If such a study were carried out, it is almost certain that the comparison would show tremendous quantitative and qualitative increases in terms of training, research and outreach related to the environment at the region's HEIs over the past twenty years.

One clear indicator of the significant progress made during this most recent stage of the process can be seen in Colombia. Since its participation in the early studies conducted by the UNEP-affiliated entities CIFCA and ROLAC, Colombia has occasionally conducted new studies and reports on the incorporation of environmental and development-related topics in HE (Ángel, 1989; ICFES, 1990; Morales, 1998; Pabón, 2006; RCFA, 2007; and Carrizosa, 2009). According to the two most recent quantitative studies, Colombian HEIs offered 465 programmes of this sort in 2006, up from 190 in 1999.

It is highly likely that similar increases in the supply of HE in environmental and development-related subjects are now taking place in other LAC countries. This is the case, for example, in Mexico, where in 1993 the Environmental Training Sub-directorate, a unit of the Ministry of Social Development's Environmental Education Directorate, published a study entitled 'Supply of Environmental Courses in Higher Education Institutions in Mexico' (Bravo, 1993). Later, in 2000 and 2001, the Mexican National Association of Universities and Higher Education Institutions (ANUIES) sent its members a questionnaire entitled 'Educational Actions Related to the Environment and

Sustainable Development in Higher Education Institutions in Mexico'. A comparison of the findings of the two studies reveals explosive growth in the number of academic programmes in the field of environmental studies, which shot up from 290 in 1993 to 1399 in 2001 (ANUIES, 2002, p. 4).

Within the frame of the Ibero-American Congress on Environmental Education held in Guadalajara (1992) a document was developed that included experiences and initiatives from different countries, which incorporated environmental education in the university context (Curiel, 1993). The Latin American congresses held in Mexico (1997), Venezuela (2000), Cuba (2003), Brazil (2006) and Argentina (2009) have continued to expand this subject.

ENVIRONMENTAL EDUCATION POLICIES IN SELECTED LAC COUNTRIES

HEIs play the leading role in the integration of environmental and sustainability-related issues in HE in LAC. Various UN agencies and international organizations – including UNESCO, UNEP and CIFCA – have also played an important part in this process. Starting in the 1970s, these institutional players were joined by the national governments of some countries, which began to formulate specific policies to guide and promote EE in all its forms and levels, including at the HE level.

An early case was that of Brazil. In 1999, the country adopted a National Environmental Education Policy with the ratification of Law 9795, whose direct precursor was Law 6938 of 1981, which established the National Environment Policy, and the Federal Constitution of 1988, which obliges the state to promote environmental education at all educational levels and raise public awareness on environmental conservation. Brazil's National Environmental Education Policy invokes this constitutional principle and makes explicit reference to the HE level, in which it promotes environmental mainstreaming in the training, specialization and continuing education of educators and professionals in all areas, as well as the preparation of professionals for environmental management activities.

In 2004, Brazil updated its National Environmental Education Programme (ProNEA), which currently spearheads the country's various actions in the field of EE. Although ProNEA does not have a special area dedicated to HE, many of its objectives and courses of action are directly related to this level. To make even further headway in this direction, Brazil is propos-

ing the formulation of an Environmental Education Policy in Higher Education (Brazil, MMA – MEC, 2005, p. 29).

Since 2002, Colombia has had a National Environmental Education Policy, which provides explicit guidelines for HEIs in this area. In fact, Article 4.9 of this policy is devoted exclusively to addressing the issue of universities, training and environmental education (Colombia, MMA – MEN, 2002, p. 27). In its section on HE, Colombia's National Environmental Education Policy begins by acknowledging the progress of the country's universities and the work done by the Colombian Network for Environmental Training (RCFA), but goes on to identify a number of shortcomings that still persist. To overcome these problems, the policy recommends that HEIs take a holistic view that will enable them to assist in the search for alternative solutions to the environmental crisis (Colombia, MMA – MEN, 2002, p. 28).

Another LAC country that has a National Environmental Education Policy is Guatemala. This policy, formulated in 2004, can be understood as a result of a process that began in 1986 with the approval of the Law on the Protection and Improvement of the Environment, which led to the creation of Guatemala's National Environment Commission (CONAMA). In 1991, the Congress of Guatemala passed a Law on Environmental Education, which identifies the value of respect for nature as one of the aims of education.

One important feature of Guatemala's National Environmental Education Policy is the fact that it identifies various ministries as governing bodies: the Ministry of the Environment and Natural Resources; the Ministry of Education; the Ministry of Health and Welfare; and the Ministry of Agriculture, Livestock and Food. Something similar happened in Brazil and Colombia, where cooperation between the environment and education ministries facilitated the approval of each country's national policies on environmental education. In contrast, the case of Mexico shows that a lack of coordination between government agencies makes it difficult for public policies of this sort to be adopted in practice. In Mexico, EE has been promoted mainly by environmental-sector institutions, while remaining under-recognized by the education sector (González, 2003, p. 8).

NATIONAL UNIVERSITY NETWORKS ASSOCIATED WITH THE RFA-LAC

Within just a few years of its creation, UNEP's RFA-LAC managed to create national networks in a few

different Latin American countries. The first of these was Colombia's RCFA. In 1982, Colombia's National Institute for Natural Resources and the Environment (INDERENA) was designated as one of the country's focal points. In general, INDERENA failed to meet expectations. Nevertheless, it did support a few activities, in particular academic events to promote environmental mainstreaming in HE.

The most important of these events was the Seminar on Universities and the Environment in Latin America and the Caribbean, held in Bogota in 1985. This event brought together 59 universities and environmental institutions from 22 of the region's countries. According to one of the organizers, the seminar heightened awareness of the scope of the environmental perspective in higher education (Ángel, 1989, p. 60). The participants in the seminar adopted a document entitled 'Ten Theses on the Environment in Latin America', better known as the Charter of Bogota. In the following years, these theses had a great influence on environmental education processes in the region's HEIs (Tréllez, 2006, p. 3).

In 1986, coordination of the RCFA was handed over to the Colombian Institute for the Promotion of Higher Education. For 10 years, this Institute, a unit of the Ministry of National Education, worked as a tireless advocate of EE in the country's HEIs. In 1996, the newly created Ministry of the Environment (MMA) took over the coordination of the RCFA. This institutional move from the education sector to the environmental sector entailed a reduction in the resources available to finance the RCFA's activities, resulting in a loss of momentum.

Finally, in 2004, the RCFA member universities decided to form a non-profit legal entity linked to the UNEP network programme but with the autonomy to make its own decisions and manage its own resources. The overall objective of this entity is to promote the creation of opportunities for cooperation, exchange and communication between the various members of the network through processes of communication, training, research, participation and management, in pursuit of sustainable development and environmental conservation in Colombia. The RCFA's roster of active members currently includes 40 Colombian universities, the Colombian Association of Universities, seven state institutions and five NGOs.

The other national networks created under UNEP's RFA-LAC programme were much less successful. In 1986, national networks and focal points were created in Argentina, Brazil, Cuba, Mexico, Nicaragua and Venezuela (Tréllez, 198, p. 9), but none of these have proved as enduring as the RCFA.

The network created by UNEP in Mexico was one of these unfortunate cases. In 1985, 25 representatives of various Mexican institutions – mostly universities – held a meeting. These institutions decided to create a coordinating committee composed of representatives of various offices of the Ministry of Urban Development and Ecology (SEDUE), the Ministry of Public Education (SEP) and the National Council of Science and Technology (CONACyT), as well as the six regional networks around which the country's HEIs are organized. However, due to various problems, in particular the failure to define a national focal point, the network failed to consolidate and its activity was suspended (ANUIES, 2002, p. 3).

Between 1988 and 1990, the networks and focal points of Argentina, Brazil and Venezuela held a series of National Seminars on Universities and the Environment on different topics. The first seminar, held in Argentina in 1988, left a series of papers on conceptual approaches in various disciplines, while the second, held in October 1989, was devoted to educational strategies (Ángel, 1990, p. 4). The seminars in Brazil and Venezuela focused on designing strategies for the development of environmental activities at HEIs.

Another national network was created under the RFA-LAC a few years later, with quite different results. In 1996, a group of Guatemalan institutions and universities decided to create the National Network for Environmental Research and Training (REDFIA), whose main purpose was to promote training and environmental research programmes by building on existing capacities and seeking international support (Rodríguez, 2010).

One last national network linked to the RFA-LAC is the Cuban Network for Environmental Management in Universities (RC-GAU). In 1994, a network under the Cuban Ministry of Science, Technology and the Environment was created to oversee EE activity at all levels of education, including the university level. In 2003, the RC-GAU was created in coordination with the Centre for Environmental Management, Information and Education (CIGEA), which acted as the focal point. In 2007, the network merged with the Cuban University Network for Ecodesign and Sustainable Consumption, which collaborates with CIGEA and the UNEP regional office (Ruiz, 2010).

NEW ENVIRONMENTAL UNIVERSITY NETWORKS IN LAC

The past few years have seen a boom in the formation of new environmental university networks in LAC, both

nationally and internationally. The number of networks is large and continues to grow, to the point that it is impossible to mention all of them; instead, we will highlight some of the region's best known networks.

One of the most recently created networks is the Mexican Consortium of University Environmental Programs for Sustainable Development (Complexus), which was created in December 2000 when a group of HEIs joined forces with the Centre for Education and Training for Sustainable Development (CECADESU), which is a unit the Mexican Ministry of the Environment and Natural Resources (SEMARNAT), and with ANUIES (Ortiz, 2010).

Another experience is Brazil's Networks for Environmental Education. In 1988, Brazil began the process of institutionalizing the practice of networked communication and social organization, with the first steps being taken by the Paulista Environmental Education Network (REPEA) and the Capixaba Environmental Education Network. In 1992, the Brazilian Network for Environmental Education (REBEA) was created, with the Treaty on Environmental Education for Sustainable Societies and Global Responsibility serving as the new organization's declaration of principles. Various state-level Environmental Education Networks were subsequently created throughout the country. In 2001, Brazil's National Environment Fund (FNMA) called for REBEA and the REPEA to be strengthened and for other regional networks to be set up. These networks were later joined by the University Network of Environmental Education Programmes (RUPEA), as well as by the National Association for Postgraduate Studies and Research in Education (ANPEd), which works specifically in the field of HE (Brazil, MEC – MMA, 2005, pp. 22, 28 and 29).

More recently, international networks have sprung up that mostly involve HEIs from the LAC region. One example is the International Organization of Universities for Sustainable Development and the Environment (OIUDSMA). Created in 1995, this network is focused on developing education and research programmes in the environment and sustainable development fields. Since 2007, OIUDSMA has been linked to the Alliance of Ibero-American University Networks for Sustainability and the Environment (ARIUSA), of which it is a founding member (Rosúa, 2010).

An even more important experience is the Environment Committee of the Association of Universities of the Montevideo Group (AUGM). This AUGM was created in 1991 with the primary purpose of leading the integration process in the Southern Cone through the creation of an expanded shared academic space based on the scientific, technological, educational and cultural

cooperation of its members (Grupomontevideo.edu.uy, 2011). The AUGM has various academic committees, including the Environment Committee, created in 1993, which aims to encourage the interaction of AUGM members dedicated to the environment and promotes joint activities involving research, outreach and teaching as appropriate means of achieving the objectives of the partner universities through the products resulting from this interaction (UNLP.edu.ar, 2011).

In northern South America, the Continental Association of Universities for Sustainable Development (ACUDES) was created in Bogota in 2009, primarily by private HEIs, with the aim of raising awareness about the importance of preserving the environment by reducing global pollution. With a total of 11 university members in Ecuador and Colombia, in addition to Harvard University, ACUDES has plans to launch several activities, including the Knowledge Network University Chairs (Barriga, 2010).

In late 2009, the Argentine Network of Universities for Sustainability and the Environment (RAUSA) was created as a result of a decision by the national universities of the Norte Grande region to promote the shared environmental and sustainability policies of the region's universities. Also in 2009, RAUSA became a member of ARIUSA (Basterra, 2010).

Finally, in early 2010, seven universities from the metropolitan area of Santiago, Chile signed the protocol of collaboration to boost the Sustainable Campuses initiative in Chile.

ALLIANCE OF IBERO-AMERICAN UNIVERSITY NETWORKS FOR SUSTAINABILITY AND THE ENVIRONMENT

ARIUSA is essentially a network of university environmental networks mainly comprising HEIs in LAC and Spain. It was created in Bogota in 2007 when representatives of the RFA-LAC, OIUDSMA, the RCFA, REDFIA, Complexus and the RC-GAU signed its articles of association.

This founding group of networks has expanded over the past two years with the addition of other university networks such as ACUDES, RAUSA, the Southern Brazilian Network for Environmental Education (REASul), the Sectoral Committee on Environmental Quality, Sustainable Development and Risk Prevention (CADEP) of the Conference of Rectors of Spanish Universities (CRUE), and the Mexican Network of Multidisciplinary Postgraduate Courses on the Environment and Sustainability (REMEPPAS).

An interesting unplanned phenomenon has emerged: new networks have arisen from within ARIUSA. These new networks are considered operational or affiliate networks.

The first of these networks – the University Network for the Environment and Sustainable Development, led by the University of Granada in Spain – was created in late 2008 by the Organisation of Ibero-American States (OEI) and the Government of Andalusia as a means of participating in the Programme for Academic Exchange and Mobility (PIMA).

The second network to be created under the umbrella of ARIUSA – the Network for Research on Science, Technology, Innovation and Environmental Education in Ibero-America (IETC-AMB) – was formed in order to participate in the 2010 edition of the Ibero-American Programme for Science, Technology and Development (CYTED). The network's first joint research project was a comparative analysis entitled 'Incorporation of Environment and Sustainability Issues in Science and Technology Systems and Higher Education in Ibero-America'.

The third operational network to emerge from ARIUSA was created in 2011 as part of a project to develop an Ibero-American Master's Degree in Environmental Science and Technology. The formal creation of this network involved six universities from Colombia and one each from Spain, Mexico and Bolivia. For its upcoming activities, it will be enjoying the support of the Postgraduate University Association (AUIP), the Inter-American Organisation for Higher Education (OUI-IOHE) and the Spanish Agency for International Development Cooperation (AECID) (Sáenz, 2011b).

CURRENT STATUS OF THE GREENING PROCESS IN HIGHER EDUCATION INSTITUTIONS IN LAC

Throughout most of the environmental mainstreaming process in HE in LAC, the primary focus has been on teaching activities. This has resulted in the creation of courses and academic programmes related to the environment in one sense or another, as well as the reform of conventional curricula to include these new topics. These new training activities have not always been accompanied by the appropriate research and outreach activities, but projects of the latter sort have also gradually become more common at universities. Since the late 1990s, in addition to implementing environmental actions in the three traditional university functions, the region's HEIs have also introduced new institutional environmental-management practices.

Unfortunately, this important and rich greening process in the region's HE system over the past few decades has been poorly documented. Recent studies have only been conducted in a handful of countries, and it is from these that we must infer the characteristics of the region's current situation.

Given the importance attributed to environmental HE, progress in the process of greening HEIs has often been measured in terms of the number of environment-related academic programmes created by universities during a given period. This figure has been used in almost all progress reports on environmental mainstreaming in HE at both the national and regional levels.

No updated information on EE programmes in LAC has been made available since the UNEP report of 1985. One attempt to catalogue progress was made in 2003 and 2004, but it was limited to postgraduate environmental programmes in Latin America. Although the study enjoyed the logistical and institutional support of the UNEP regional office, its results were very poor: information was requested from 432 universities in 21 Latin American countries, but just 80 of them responded. With those responses, the study was able to identify just 97 postgraduate-level EE programmes in 13 Latin American countries (Eschenhagen, 2009, p. 174).

Mexico and Colombia offer more useful statistics from the same period. ANUIES identified 1399 environment-related programmes in Mexico in 2001 (ANUIES, 2002, p. 4), while the RCFA reported 465 environment-related university programmes in Colombia as of late 2006 (RCFA, 2007).

Taking these national-level data as a reference, we can estimate that the region's universities currently offer several thousand EE programmes. The environmental-research and university-outreach projects in this field are likely to be even more numerous. The number of HEIs in LAC that have undergone a significant degree of greening can probably be counted in the hundreds.

These estimates give a rough idea of the general magnitudes of the most important variables in the process of greening HE in LAC, but they fall far short of providing good knowledge of the current situation. Therefore, there is an urgent need at the regional level for further studies on various aspects of environmental mainstreaming at the region's HEIs.

In the absence of precise figures that paint a complete picture of the current situation in LAC, we can point to some of the most significant achievements of the region's universities in this field. The remainder of this article will describe a few dozen of these

achievements. We must bear in mind, however, that the sheer number of HEIs in the region that carry out training, research, outreach and environmental-management activities makes it impossible to mention all of them in a short article.

ENVIRONMENTAL EDUCATION PROGRAMMES AT HIGHER EDUCATION INSTITUTIONS IN LAC

Environmental HE is understood as a set of pedagogical discourses and educational practices related to the environment – in other words, HE that makes reference to the relationship between humans and nature, undertaken amid an increasing diversity of meanings. In environmental HE, various ideas and actions are put forth and organized into specialized training programmes on issues related to the environment and sustainability.

In LAC, there is no official classification of areas of emphasis or knowledge into which EE programmes can be grouped. Even the few researchers who work in this field have reached no consensus as to what categories should be commonly used. It is possible to use the conventional classification of areas of knowledge, as was done in the ANUIES study of 2002. Nevertheless, this classification has been seriously questioned by the community of environmentalist scholars and scientists in LAC because it does not recognize environmental sciences as a new area of knowledge (RCFA, 2007).

Given these circumstances, it seems logical to classify environmental training programmes on the basis of their different objects of knowledge and intervention. Using this criterion, training programmes can be classified according to area of focus: natural resources, habitat or land, terrestrial and marine biota, pollution problems, natural hazards, or various specific environmental issues.

To provide a general overview, we can divide the thousands of environmental HE programmes currently offered by HEIs in LAC into the proposed categories and focus on representative programmes selected from each group. The programmes can be chosen arbitrarily or using a database. At present, only two databases are known to be available: a list of environmental postgraduate programmes in the region developed by ROLAC in 2004, and a database on environmental programmes in Colombia developed by RCFA in 2006.

Using the proposed classification, the two aforementioned information sources and quick internet searches, the environmental HE programmes shown below can be identified as a small sample of the huge academic

offering available at the region's universities in this new area of knowledge.

Within the group of programmes focused on knowledge and use of natural resources, the following subcategories are clearly distinguishable:

Area	Programme
Natural resources in general	Master's Degree in Management of Natural Resources, State University for Distance Education, Costa Rica
Forest resources	Forest Engineering, Mayor University, Chile (UMAYOR.cl, 2011) Master's Degree in Management and Conservation of Tropical Forests, Tropical Agronomic Centre for Research and Teaching
Water resources	Specialization in Environmental Management of Water Resources, Central University, Colombia
Soil resources	Master's Degree in Management and Conservation of Water and Soil, University of Cuenca, Ecuador
Fish and fishery resources	Fishery Engineering, National University of Callao, Peru

Within the group of programmes focused on knowledge and use of land, the following three subcategories are distinguishable:

Area	Programme
Watershed management	Master's Degree in Comprehensive Watershed Management, Autonomous University of Querétaro, Mexico (UAQ.mx, 2011a)
Land and habitat studies	Master's Degree in Human Settlements and Environment, Catholic University of Chile
Regional planning	Master's Degree in Urban and Regional Planning, University of Buenos Aires

Within the group of programmes focused on knowledge and conservation of biota, the following two subcategories are distinguishable:

Area	Programme
General biology	Undergraduate Degree in Environmental Biology, Jorge Tadeo Lozano University, Colombia
Ecology	Master's Degree and PhD in Ecology, University of Brasilia

Within the group of programmes focused on knowledge and management of marine environments, the following three subcategories are distinguishable:

Area	Programme
Marine science	Specialization in Marine and Coastal Environmental Management, Naval Academy of Colombia
Marine biology	Bachelor's Degree in Marine Biology, University of the Sea, Oaxaca, Mexico
Oceanography	Master's Degree in Oceanography, University of Valparaíso, Chile

Within the group of programmes focused on knowledge and management of pollution, at different historical moments, two subcategories of programmes have emerged that are closely related but which receive different names. A widespread trend in recent years is to offer programmes that integrate the two approaches.

Area	Programme
Sanitary engineering	Central American Master's Degree in Sanitary Engineering, San Carlos University, Guatemala
Environmental engineering	Undergraduate degree in Environmental Engineering, Catholic University of Asunción, Paraguay
Sanitary and environmental engineering	Master's Degree in Sanitary and Environmental Engineering, Santo Domingo Institute of Technology, Dominican Republic (INTEC.edu.do, 2011)

More recently, we have seen the emergence of environmental training programmes focused on the management of natural hazards. The first programmes of this sort to be offered were those relating to hazard management in general, such as the Master's Degree in Socio-natural Hazard Management, offered by the University of the Andes in Venezuela (ULA.ve, 2011). In recent years, we have begun to see programmes related to climate change, such as the Advanced Specialization in Climate Change and the Development of Clean Mechanisms, offered by the Simón Bolívar Andean University in Ecuador (UASB.ec, 2011).

It can also be useful to classify environmental HE programmes according to whether they are primarily monodisciplinary or interdisciplinary. Of the programmes that are primarily monodisciplinary, some are rooted in the social and human sciences whereas others focus mainly on the physical and natural sciences.

The programmes rooted in the social and human sciences are intended to train environmental educators; one example is the Specialization in Environmental Education offered by the Pedagogical and Technological University of Colombia. Programmes like this are offered at all levels of HE and are among the most common types of environmental programmes. In a closely related field of knowledge and action, the region's universities have recently begun to offer environmental communication programmes, one example being the Specialization in Environmental Communication offered by the National University of Rosario in Argentina (UNR.edu.ar, 2011).

Latin American HEIs also offer EE programmes focused on many other social and human sciences. For example:

Programme	Institution
Master's Degree in Environmental Geography	University of Panama
PhD in Environment and Society	Federal University of Campinas, Brazil
Master's Degree in Environmental Psychology	National Autonomous University of Mexico
Master's Degree in Environmental Law	University of Palermo, Argentina (PALERMO.edu, 2011)
Master's Degree in Environmental Economics and Natural Resources	Autonomous University of Baja California Sur, Mexico
Master's Degree in Environmental and Regional Policy	Bolivian Centre for Multidisciplinary Studies (CEBEM.org, 2011)

Monodisciplinary EE programmes are also offered in the physical and natural sciences. Examples include the following:

Programme	Institution
PhD in Applied Environmental Geology	Autonomous University of Nuevo León, Mexico
Bachelor's Degree in Environmental Chemistry	University of Chile
Master's Degree in Geochemistry and the Environment	Federal University of Bahia
Technical Degree in Environmental Physics	National University of Tucumán (ELDIARIO24.com, 2011)

More recently, HEIs in LAC have begun to offer programmes in environmental sciences with a clear interdisciplinary approach. The concept has encountered some resistance to recognition in the HE systems of certain countries, including Colombia. Nevertheless, in addition to seeking formal recognition (RCFA, 2007), Colombian universities are offering a growing number of educational programmes in this new area of knowledge. Colombian institutions already offer programmes of this sort at all levels of HE; examples include the Joint PhD offered by the University of Valle, the University of Cauca and the Technological University of Pereira; the Master's Degree offered by the University of Antioquia; and Undergraduate Degree offered by the University of Applied and Environmental Sciences. A similar rise in environmental-sciences programmes is being seen in other Latin American countries.

The largest number of EE programmes offered by universities in LAC fall into the category of environmental management and planning and, consequently, the study of the relationship between development and the environment. Examples of programmes of this sort include the following:

Programme	Institution
Master's Degree in Environmental Planning and Management	University of Chile
Advanced Studies Programme in Sustainable Development and the Environment	The College of Mexico
PhD in Planning and Sustainable Development	Autonomous University of Baja California (UABC.mx, 2008)
Specialization in Ecology, Environment and Development	INCCA University, Colombia
PhD in Environment and Development	Federal University of Paraná, Brazil

In this group of programmes, the Master's Degree in Environmental Management offered by Bogota's Pontifical Xavierian University stands out from the pack. Due to its interdisciplinary approach, it is recognized as one of the leading environmental postgraduate courses in Colombia and in LAC as a whole (Eschenhagen, 2009). The programme also has a very interesting history. It was launched in 1982 under the name of Master's Degree in Sanitation and Environmental Development, and in the early 1990s it was renamed the Master's Degree in Environmental Management for Sustainable Development (Sáenz, 1997). However, following the latest curricular reform, the term 'sustainable development' was eliminated from the programme's name. This case is fairly representative of a school of thought – increasingly popular among the region's academic community – that calls into question the notion of sustainable development.

ENVIRONMENTAL RESEARCH AND OUTREACH EXPERIENCES IN THE REGION

In addition to providing HE, the other two traditional functions of universities are research and community outreach.

Environmentalism emerged in the mid-20th century as a response to the serious problems that societies began to perceive and to experience directly in their relationship with the natural environment. In order to address the global environmental crisis, society first needed to gain knowledge of the new situations they faced. To do this, they called on the scientific community, which in LAC is concentrated in the universities. This was the beginning of the greening of university research – a process that is still ongoing.

The number of researchers, projects, research groups and research centres are the indicators most frequently used to keep track of the research activities taking

place at HEIs. Unfortunately, no reliable information is available on scientific activity in the environmental field. As with other aspects of the greening of HEIs, the available data are sparse and incomplete.

Under these conditions, if we wish to provide an overview of the status of environmental research at the region's universities, at present we can only draw on the information provided by one or two national cases and reviews of a handful of particular experiences that circulate among interested parties or can be found on the internet.

Another aspect of interest is the close link between environmental research and HEIs' environmental and sustainable-development outreach activities. The vast majority of scientific and technological activities at these institutions target specific environmental situations or problems. Research on environment-related subjects tends to be applied research, as it almost always aims to provide the knowledge necessary to manage situations or solve problems. This applicability is intrinsic to technological development and innovation in this field. This is not to say that there is no basic research carried out in environmental subjects, whether in the humanities and social sciences or in the physical and natural sciences; however, it is clear that the basic research in this area is indeed limited.

This strong link between environmental research and environment-related university outreach is seen clearly in the practices of researchers, research groups and research centres working in this field. In addition to strictly conducting research, in LAC many of these entities often engage in consultancy and advisory projects, both for government agencies and for private companies. Others complement their activities with or specialize in support projects aimed at solving the environmental problems that communities face or improving their quality of life. As a result, research/action/participation projects in environmental and sustainable development fields are common at universities.

Although the environmental research/outreach activities carried out at the region's HEIs have yet to be exhaustively quantified, some orders of magnitude can be indicated: research centres number in the hundreds; research groups number in the thousands; researchers number in the tens of thousands; and research/extension projects are even more numerous.

By way of example, in 2007 in Colombia, there were 574 research groups linked to the National Environmental Science and Habitat Programme, which is part of the National Science and Technology System (Parra and Vásquez, 2007, p. 167). From this data we can infer that, in Colombia alone, there were close

to 2000 environmental researchers and a somewhat smaller number of active research projects at that time. If this figure is extrapolated to countries such as Brazil and Mexico, we can expect a total of close to 10,000 researchers to be working on environmental subjects in each country.

Because these figures are so large, it would be unrepresentative to cite particular examples of researchers or research projects, or even research groups. A better way to get an idea of the current status of this aspect of the greening of the region's HEIs is to present a handful of research centres specialized in environmental subjects. Although well known, these centres are not necessarily the largest of their kind, nor are the research/outreach experiences the most interesting on record. This is merely a small sample intended to illustrate some of the environmental science practices that have been developed at universities and other research centres in LAC.

The Centre for Environmental Sciences at the University of Concepción is a multidisciplinary and interdisciplinary academic unit focused on research, training, outreach and technical assistance in environmental subjects. The EULA-Chile Environmental Sciences Centre debuted in the 1990s with a research project, conducted in cooperation with Italian universities, entitled 'Management of Water Resources in the Biobío River Basin and the Adjacent Coastal Area'. Its research units are specialized in aquatic systems, regional planning and environmental engineering (EULA.cl, 2011).

The Institute of Ecology, based in Xalapa, forms part of Mexico's science, technology and HE systems. Established in 1975, it was the first institution of its kind in the country devoted exclusively to ecological research. Although not a university, since 1994 the Institute of Ecology has provided training at the master's and doctoral levels for small groups of students. It is primarily involved in research oriented towards the optimal use of natural resources and the conservation of biodiversity in Mexico. It also provides counselling services for some industries, such as tourism, and carries out research projects with international cooperation. It is described as perhaps the most important research and HE institution in its field in Latin America (ANUIES.mx, 2011b).

Colombia boasts several environmental research centres that have extensive experience and enjoy international recognition. One such centre is the Institute for Environmental Studies (IDEA), a unit of the National University of Colombia. The IDEA is an interfaculty institute involved in research, interdisciplinary teaching

and outreach at four locations in different regions of Colombia. Its current work focuses on economics and the environment, culture and environmental education, transport and the environment, urban environmental management, and agricultural environmental studies (IDEA.UNAL.edu.co, 2011).

Another important centre is the Institute for Research and Development in Water Supply, Environmental Sanitation and Water Conservation (CINARA), which opened in 1985. It is attached to University of Valle's Engineering Department and defines itself as a transdisciplinary research institute for development in the field of environmental management, with a focus on water management (CINARA.UNIVALLE.edu.co, 2011). CINARA is well known throughout LAC and other regions for its work in this field.

In Ecuador, the Socio-Environmental Studies Programme, organized by the Latin American Faculty of Social Sciences (FLACSO), aims to promote analysis, debate and interpretation of the interrelationships between the environmental and social aspects of Latin America's socioeconomic dynamics (FLACSO.org.ec, 2011). Although it offers a Master's Degree in Social and Environmental Studies, the Programme's team is devoted primarily to research. Its projects include the Socio-Environmental Observatory, which is dedicated to monitoring the social and environmental impacts of certain economic activities, such as those of the oil industry, and the resulting socio-environmental conflicts brought about in Ecuador and the Andean subregion.

Finally, the Federal University of São Paulo is currently working to create an Institute for Marine and Environmental Sciences, which it hopes will emerge as a major centre of national and international excellence. In addition to offering undergraduate and postgraduate courses, this new institute will primarily carry out research and outreach activities in the following fields: health and the environment; ecotoxicology and environmental monitoring; physical, chemical and biological oceanography; marine sciences, marine biology and biotechnology; fishing and agriculture; and port affairs (César, 2011).

This last case illustrates the fact that the greening process of university research and outreach activities in LAC continues unabated. In fact, the process seems to be accelerating, as the region has seen quite a boom in environmental research.

Events such as Mexico's National Congress of Environmental Sciences have helped to spread the results of this work to society. In Colombia, the Congress of Environmental Sciences and Technologies has provided a similar venue since 2010.

INSTITUTIONAL ENVIRONMENTAL MANAGEMENT EXPERIENCES AT HIGHER EDUCATION INSTITUTIONS IN LAC

In recent years, the universities of the region have grown increasingly concerned with their own environmental performance. In 1999, the Union of Universities of Latin America and the Caribbean (UDUAL) published its 'Declaration on Latin American Universities in the 21st Century'. In this Declaration, 170 universities from 22 LAC countries, all affiliated with UDUAL, pledged to exercise leadership in caring for and preserving the many dimensions of our natural environment (UDUAL.org, 2011). UDUAL has fulfilled its promise in recent years by participating in the Decade of Education for Sustainable Development (DESD). As part of the DESD, UDUAL proposed a working agenda that urged the region's universities to reflect on sustainable development and listed the steps that must be taken, including each institution taking responsibility for its own environmental impacts.

In 2011, OUI-IOHE published its 'Declaration for Sustainability of and from Universities', which was signed by 52 HEIs, the vast majority from LAC countries; numerous other universities and university networks have subsequently voiced their support for the Declaration. In the 'Declaration of the Americas', the OUI-IOHE universities pledged to strengthen the capacity of institutions and of the inter-American university community to move towards sustainable modes of thought, knowledge and action that bolster their commitment to sustainability (OUI.IOHE.org, 2011).

Adhering to their commitments, many LAC universities have progressively implemented various institutional environmental-management practices. One example is given by the members of Complexus. This Mexican consortium only admits universities that have a thematically and institutionally cross-cutting programme expressly created to promote educational activities focused on the environment. These programmes take many forms, mainly due to the varying degrees of importance that authorities ascribe to the need to coordinate efforts in this area (Bravo, 2003, p. 2).

The diversity of the actions undertaken by LAC universities to meet their environmental commitments first came into focus at the Fourth International Seminar on Universities and the Environment. This event, held in Bogota in 2007, focused specifically on the environmental management and planning of university campuses. The Seminar's purpose was to shed light

on the most important experiences in environmental management and planning at HEIs in LAC and other regions of the world.

On the basis of the reports received, a systematic analysis and reflection on environmental management and planning on university campuses was carried out. One of the main conclusions of the study was that there is no common model for the organization of environmental management at HEIs in Latin America and the Caribbean or in any other region (Sáenz, 2007). On the contrary, in this area universities have shown a great capacity for invention and innovation, which is embodied in the myriad names given to the environmental management systems they implement.

One of the best-known examples of this phenomenon is provided by the Autonomous University of San Luis Potosí (UASLP). The UASLP's Environmental Management System forms part of the institution's Environmental Agenda, which contains two other strategic elements: the Multidisciplinary Postgraduate Programme in Environmental Sciences, which conducts research and trains high-level human resources, and the University Academy for the Environment, which works to incorporate environmental perspectives in curricula and teaching methods. The UASLP's Environmental Agenda is overseen by a unit attached to the rector's office that was created in 1998. This environmental management system was implemented in 2002 (UASLP.mx, 2011) with the specific aim of bringing the UASLP's environmental performance up to an appropriate level. The system comprises three components: the Environmental Audit and Assessment, the Environmental Management Plan and the Performance Indicator System (Medellín and Nieto, 2007).

Also in Mexico, the Autonomous University of the State of Morelos (UAEM) adopted a University Environmental Management Programme in 2002 with the aim of promoting an environmental policy that respects and preserves the university environment through an approach that runs from corrective to preventative. This programme's actions cover five areas: integrated waste management, efficient management of water and energy, hazards and safety, the natural environment and landscape architecture, and environmental education. Among other activities, UAEM has enrolled in the National Environmental Audit of the Federal Environmental Protection to achieve in the future of the Environmental Complicance Certificate (Ortiz et al., 2007).

In Colombia, the University of Applied and Environmental Sciences (UDCA) is one of the HEIs

that has made the greatest progress in institutional environmental management. In 2000, the UDCA Governing Board adopted its first environmental policy, which was subsequently revised in 2007. In the text of the policy, the UDCA pledged to continually improve the institution's environmental performance by preventing pollution and reducing environmental impacts (Anzola and Espinosa, 2007). The UDCA's Environmental Management and Sustainable Development Unit, which is attached to the Department of Planning, is responsible for implementing the policy (UDCA.edu.co, 2011). Since late 2005, the UDCA has been committed to implementing an environmental management system in accordance with ISO Standard 14001:2004. For its work in this field, the UDCA was recognized for its progress towards environmental excellence by the Bogota city environmental authority.

As a local state university, the District University of Bogota was required to develop and launch an Institutional Environmental Management Plan. The environmental policy adopted by the university's rector in 2007 provided the general outline for the Plan, which is intended to improve environmental conditions in the university's facilities, enhance quality of life, raise the university community's levels of health and welfare, comply with laws responsibly, contribute knowledge and practices in environmental management, use resources efficiently, recycle and reuse materials, and properly treat and dispose of waste (Sánchez, 2007).

In Brazil, the University of São Paulo started a programme called Recycle USP in 1993. Still in effect today, this programme addresses issues related to the USP's solid waste management and also provides EE. By means of educational, informational and integrated waste-management initiatives, the programme aims to make the USP a point of reference in terms of responsible consumption and proper waste disposal. The programme is in effect on all USP campuses and directly involves nearly 700 faculty, staff and students (USP.br, 2011). Since 2007, the USP has been collaborating with the ECOCAMPUS Office of the Autonomous University of Madrid on a project intended to enhance the environmental performance of the two universities, both of which are sustainability-oriented (UAM.es, 2011).

The HEIs of LAC are home to many other environmental-management experiences. Space limitations prevent us from describing them all; the projects mentioned are among the best known but not necessarily the most advanced. An exhaustive study would surely find that the great diversity of approaches and practices in this field make it impossible to identify a

single model. Such a study would also show that the region's HEIs are continually undertaking a broader and more effective environmental commitment.

TOWARDS COLLECTIVE RESEARCH: A STRATEGY GOING FORWARD

By describing some current experiences in training, research, outreach and university management related to the environment and sustainability, this paper has presented a very general outline of the historical process of environmental mainstreaming at HEIs in LAC. This process is undoubtedly much more complex than what can be captured in a brief review.

To appreciate the full magnitude and importance of the progress HEIs in LAC have made in terms of greening, a research programme needs to be designed and implemented in order to investigate the historical process and the current status of environmental mainstreaming. Owing to the complexity of the endeavour, such a programme can only be undertaken collectively and over the long term.

Similar proposals have been put forth by other researchers focused on EE, as well as by leaders of the Latin American environmental thought movement. One such leader is Enrique Leff, who in the preface of a recent book (Eschenhagen, 2009) proposed the creation of a true research programme in the field of EE at the university level. Leff advocates a programme of this sort as a means of assessing and scrutinizing the many projects that are cropping up at universities in LAC (Leff, 2009b, p. xxi).

As made clear in this paper, predecessors of such a research programme on the greening of HEIs date back at least as far as the early 1970s. The programme should take into account all international, Latin American and national EE programmes at the university level that have been referenced, mentioned or reintroduced here, as well as in the work of writers from Latin America and other regions.

Without a doubt, this line of research has already made significant progress, but a genuine research programme has yet to be established. In fact, the proposed object of study has received far less attention than other lines of research on EE. According to the most recent available assessment, environmental HE in LAC has not been widely investigated because many more studies on EE have focused on the primary and basic levels, as well as non-formal EE (Eschenhagen, 2009, p. xxiv).

This lack of research on the greening process of

HEIs stands in contrast to the subject's importance to contemporary societies. It is these university programmes that are training professionals capable of meeting the challenge of environmentalism, with first-hand experience and a future-oriented outlook in the constitution of sustainability (Leff, 2009, p. xxi).

Since the UNEP report published in 1985, there has been no systematic monitoring of the emergence, configuration or institutionalization of research and EE programmes in LAC. To correct this shortcoming, a systematic process for monitoring and evaluating university greening must be put into place (Leff, 2009, p. xvi). At the regional level, this need is being partially addressed by means of a comparative research project on the incorporation of environmental and sustainability-related issues in the HE systems of several Latin American countries (Sáenz, 2010).

Nevertheless, this and other projects are just the beginning of what needs to be a much broader research programme. The research should complement and go beyond the reports that have been published with some regularity in countries such as Colombia and Mexico. In addition to taking inventory and developing creation timelines, researchers must analyse and evaluate the existing programmes. After having partially catalogued the emergence, establishment and institutionalization of new environmental and sustainable development (or sustainability) programmes at universities, researchers should undertake a thorough investigation of the strategies and contents thereof and record the various ways in which environmental aspects and environmental knowledge are incorporated in these programmes (Leff, 2009, p. xix).

This assessment should take into account the objectives, curricular structure, syllabuses and specific content of programmes offered by HEIs in LAC. But this, by itself, is not enough. Researchers should also evaluate the teaching methods and educational practices being developed in the region.

This assessment of the curricula and teaching methodologies of university programmes must necessarily lead to consideration of their epistemological basis. Epistemological vigilance is unavoidable when examining, for example, the ways in which these programmes approach interdisciplinarity and the dialogue of knowledge, or the various environmental concepts on which they are based (Leff, 2009, p. xvii).

Only once we have gained broad, in-depth knowledge of the multiple aspects of the current EE situation in LAC will we be able to justify making recommendations aimed at correcting shortcomings, building on strengths or proposing a reorientation of the current

process. It is better to know and understand before rushing into action. In any event, for some guidance in this area, readers are referred to the very recent ‘Declaration for Sustainability of and from Universities’ (OUI.IOHE.org, 2011), which features entirely valid statements and proposals.

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