UNESCO CHAIR ON SUSTAINABILITY

AT UNIVERSITAT POLITÈCNICA DE CATALUNYA - BARCELONATECH

United Nations
Educational, Scientific and
Cultural Organization

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INTRODUCTION

2019 has been a year of rising global challenges, with growing concern around the world regarding the effects of climate change, increasing political instability leading many times to mass migration and accelerating rates of biodiversity loss. The scale and complexity of the sustainability challenges we face is overwhelming. Clearly, the current global development model focused on short-term economic profit with unlimited production and consumption patterns is unsustainable.

Atmospheric methane levels in the Arctic are currently at new record highs, averaging about 1900 parts per billion. NASA researchers have found local methane plumes as large as 150 kilometres across - far higher than previously anticipated. New models of temperature variability suggest that poorer tropical regions are likely to suffer more than other areas from global warming, with largest increases in temperature variability. That regional changes will create new inequalities in climate change impact between rich and poor nations.

Therefore, we will need to make a consistent effort to find solutions to these challenges. But more urgent and more necessary, we need to act now. In that sense, the UNESCO Chair on Sustainability (UNESCOSOST) launched this year the new slogan #Action for transformation. Today, we have to act in order to reduce social, economic and environmental vulnerabilities and to strengthen social, economic and cultural diversity.

Being aware of the fundamental challenges the world faces today, training future engineers and professionals should always be focused on transdisciplinary problem solving addressing the world's most pressing problems. With our partners from UNESCOSOST Joint Offices and RECNET, we developed during last 5 years an international hub for resilience and sustainability science applied for transformation at local and regional scales. Our goal is to jointly develop an interdisciplinary space integrating research, training, information and documentation on engineering and technologies resources for sustainability and for water science.

There could be some reason for optimism. We are witnessing unprecedented leadership and innovation driven by cities, regions and business, rising civic activism and advocacy by many young people, and rapidly growing awareness about issues such as plastic waste, pollution, biodiversity loss and nature based solutions.

Unquestionably, one highlight of 2019 for UNESCOSOST was the completion of the AQUARISC project in Cauca, Colombia, where ecotechnologies for risk and vulnerability reduction in drinking water systems and river basin protection were developed and built in a co-design framework with communities from 9 municipalities. All interventions performed used nature-based solutions and took into account the intangible cultural heritage of the area.

Without any doubt, the success of #Action for transformation it should be based in the Intangible Cultural Heritage. During 2019, UNESCOSOST researchers have been working with Zenu and Andoke communities from Colombia and Zapotec from Mexico, among others, to contribute to the Rescue of Traditional Practices associated with social uses, knowledge, practices and ritual events related to adaptive processes to habitat and nature.

Another basic aspect in all our projects is the participatory approach. Being aware that the governance of water is a matter of social construction that is achieved through the active participation of the community, UNESCOSOST is working hard with the Terrassa Water Observatory, as an innovative project to establish

a social control over the management of the resource, create a new culture of water for citizens and prepare proposals into the political level and participate in the governance. The Observatory was created by the public administration as a result of the process of remunicipalization of water after 75 years of being managed by the private company.

At the same time, UNESCOSOST was working close together with other public water companies, developing during 2019 an innovative report on Circular Economy for Aigues de Mataró (AMSA), and initiating a collaboration with Aigues de Reus to carry out a sustainability and circular economy analysis, which will be completed during the spring of 2020.

Another highlight was the presentation last October 7 at CaixaForum in Barcelona of the COTEC "Report on the Situation of the Circular Economy in Spain", developed by the UNESCO Chair on Sustainability at the UPC, ASYPS and the RECNET network. According to the report, with the economic recovery the change from linear to circular model has stagnated and is currently not progressing at the pace that would be necessary.

With the opening of the UNESCOSOST Joint Office located in La Salle University in Bogota, the UNESCO Chair on Sustainability at the UPC expands to fifteen offices in Latin America located in University centres from Mexico, Argentina, Brazil, Peru and Colombia. Our extensive network of partners had permit us to organize meetings and international conferences every year. On July 6-7 we had the pleasure to meet in Huay-Huay, Peru, with several delegations from America and Europe, in the 1st International Summit on Public Management and Sustainable Development.

Another important new is the constitution of the NATURA network, "Nature-based Solutions for Urban Resilience in the Anthropocene", funded by the US National Science Foundation for five years. NATURA is designed to be an international network of networks that exchange and synthesizes knowledge, data, and solutions among researchers and practitioners on nature-based solutions to advance urban resilience.

The following pages describe the most important projects developed by UNESCO Chair on Sustainability and its powerful network of allies, as a sample of #Action for transformation. We would like to thank you for your continued support and look forward to our ongoing collaboration.

Dr. Jordi Morató
Coordinator
UNESCO Chair on Sustainabilty at UPC

UNESCOSOST MISSION OUR MISSION / OUR OBJECTIVES

To promote an interdisciplinary space integrating research, training, information and documentation on engineering and technologies resources for sustainability and for water science, to reduce social, economic and environmental vulnerabilities and to strengthen social, economic and cultural diversity.

The UNESCO Chair on Sustainability (UNESCOSOST) is an international centre of excellence for resilience and sustainability science applied for transformation at local and regional scales.

Through the cooperation with other universities and stakeholders, UNESCOSOST develops an approach integrating research, knowledge generation, capacity building and global cooperation to promote innovative technologies to meet social, environmental and economic needs and thus contribute to prepare students from different cultures for XXI century global society.

We articulate a participatory community development approach oriented to Sustainable Development Goals (SDG) with the purpose to implement and transfer experiences of transformation based at local scale. Our strategy plan develops a relevant dialogue with socio-environmental parties in territory to promote empowerment of all stakeholders, bridging the gap between the academic world and civil society, local communities and public administrations.

We create, maintain, spread and reinforce the dynamism of a network of institutions for the development of socio-technical innovation, aimed at reducing the socio-economic and environmental impact of cities and urbanization, facilitating the collaboration between teaching

staff of the UPC (Universidad Politécnica de Cataluña) and other institutions, strengthening North-South, South-South and North-South-South cooperation.

We adopt a holistic approach to global change focused on four main areas of work (water, energy, land and biodiversity), and create a hub of excellence and innovation on key challenges related to circular economy, adaptation and mitigation to climate change and intangible heritage.

OUR VALUES

A REFERENCE INSTITUTION IN #ACTIONFORTRANSFORMATION

We believe in the importance of applied science connected to participative transforming actions. The traditional development methodology can no longer be done without an increased understanding of nature's role for our own survival and well-being.

INTERNATIONAL AND MULTI-NETWORK

#ActionForTransformation is designing through our presence in 15 offices from 5 countries, working locally, regionally and globally, with international multidisciplinary staff.

INTEGRATED

#ActionForTransformation is working at a local, regional and global level, with multi-, inter- and transdisciplinary schemes, adopting a holistic approach to global change, focusing on four main areas of work: water, energy, territory and biodiversity.

PARTICIPATIVE TRANSFORMATION

#ActionForTransformation is implementing projects with community development approach oriented to SDG, integrating research, knowledge generation and transfer, capacity building and global cooperation.

INNOVATION

#ActionForTransformation is in appropriate technologies to meet social, environmental and economic needs.

MULTIDISCIPLINARY

Our team is conformed by more than 30 experts worldwide with skills that cover a wide range of domains at a technical and social level.

UNESCOSOST IN NUMBERS

THE UNESCO CHAIR ON SUSTAINABILITY (UNESCOSOST)

ESTABLISHED AT THE POLYTECHNICAL UNIVERSITY OF CATALONIA IN

1996

Is an organization dedicated to articulate and facilitate a multi-networking collaboration between different institutions in Europe and Latin America and the Caribbean, focused on knowledge and best practices transfer in sustainable human development, from local scale to the global level.

The work carried out over the last

20 YEARS

has contributed to turn UNESCOSOST into a model and a pole of innovation and excellence in matters related to the sustainable human development, especially in sustainable water resources management in innovative technologies to meet social, environmental and economic needs, and in the design and articulation of transformation participative projects oriented to SDG.

#ActionForTransformation Impact on Education

THE IMPACT ON EDUCATION IS HIGH WITH AN AVERAGE OF

- **500** UNDERGRADUATE STUDENTS PER YEAR
- **5** MASTER THESIS/YEAR
- **4** PHD THESIS PER YEAR

#ActionForTransformation Research Projects

- **16** RESEARCH PROJECTS
- **5** YEARS

WITH A TOTAL BUDGET OF **6,4 MILLION US$** (INCLUDING INCOME TO ALL PARTNERS),

- **14** TRANSFORMATION PROJECTS
- DURING LAST **5** YEARS
- WITH A TOTAL **6,3 MILLION US$** BUDGET WITH ALL OUR PARTNERS

#ActionForTransformation International Mobility

Most activities have benefited from our extensive international mobility a total of

- **34 STUDENTS** during the last
- **6 YEARS** including personnel at different levels and profiles, thanks to the large number of networks
- **7** directly created.

1. SOCIAL IMPACT & PARTICIPATIVE COMMUNITARY DEVELOPMENT

The UNESCO Chair has developed a comprehensive pack of methodologies and tools to linkage social agreement with territorial transformation and development. A strong innovative research in this line is being jointly conducted with the support of its multiple partners and experiences in different countries.

Participatory community development is promoted by assessing the potential of the people, sharing experiences, promoting socio-environmental actions to promote awareness, articulation and link the empowerment of all stakeholders.

We involve affected people in the transformation processes in order to ensure greater commitment and to enhance communication between all stakeholders. The inclusion of the population in work teams, facilitates an integrated approach to achieve the common goals. The experience gained by the UNESCO Chair in the resolution of environmental conflicts is offered to the global community in general, for the construction of a stable and lasting TERRITORIAL PEACE.

1. SOCIO-EVIRONMENTAL RESTORATION IN MORAVIA, MEDELLÍN

UNESCOSOST OBJECTIVE

The project started with the aim of resolving the environmental problemcaused by polluted effluents (leachate) issued by municipal solid waste found in this old dump of Medellin, through the implementation and use of appropriate technologies, based on natural treatment systems, remediation and management of runoff water: Constructed Wetlands and Buffer Strips.

PARTNERS

•Alcaldía de Medellín
•Area Metropolitana del Valle de Aburrá (AMVA)
•UNESCOSOST Colombia Joint Office (TDEA-UPC)
•Cojardicom
•Programa Barcelona Solidaria - Ajuntament Barcelon

KEY ASPECTS

The socio-environmental restoration project of Morro de Moravia was able to articulate a model of transformative project where local and international universities have worked together with the Public Administration from Medellín, Colombia and with communities from the area.

One of the key aspects of this project has been the creation of the Community Gardens Moravia Group (GJCM), which in April 2014 was established as a COJARDICOM corporation. This group was formed by the Joint Office UNESCOSOST Colombia Joint Office (TDEA-UPC), as an educational, social and gender work tool, with the women from the community for the transformation of the garbage dump in a flower garden, a new icon of the city of Medellín

ACHIEVEMENTS

The main achievements and profits in the project are as follows:

- Sustainable Sanitation using appropriate technologies based on natural treatment systems and improving the quality of life for residents.
- Promoting citizen participation through the "Moravia Week" workshops.
- Participatory process with multiple stakeholders and institutions.
- Training and integration of interdisciplinary teams.
- Wide dissemination and communication of the transformation process.

2. RECOVERY OF SOIL PROTECTION ZONE DECLARED IN THE RISK SECTOR ALTOS DE LA ESTANCIA, CIUDAD BOLIVAR, BOGOTÁ

PARTNERS

•Distrital Institute of Risk and Climate Change Management (IDIGER)
•Joint Office UNESCOSOST Colombia (TDEA-UPC)
•RECNET
•Bogota Botanical Garden (JBB)

UNESCOSOST OBJECTIVE

The participatory transformation process that took place in Moravia, Medellin was transferred to Bogota, following the same scheme as embodied in the process of appropriation-based training, creation of runoff pilot management, bioengineered plants, and promoting community initiatives for monitoring and sustainable local human development incentives. Main objective of the project was to was to encourage and implement community sustainable projects for **risk reduction and specially for landslide risk management,** through sharing experiences, conducting socio-environmental and awareness for citizen ownership of the park.

KEY ASPECTS

The "Altos de la Estancia" project in Ciudad Bolivar (Bogota, Colombia) was selected on 2015 among the top 20 global risk management initiatives (Sendai Summit, 2015).

ACHIEVEMENTS

- Coordinate actions to stabilize the soil, mitigate risk and restore eroded and degraded areas using bioengineering techniques such as trinches with local materials, such as "guadua" (local bamboo).
- Manage runoff and lessen their impact in the generation of risk, using fitotechnologies, such as evaporative biofilters.
- Recognize the risk as a social construction, and risk management as a participatory process that seeks to improve the living conditions and welfare of the population through the reduction of losses and damage.
- Promote local development through the investment in 4 local corporations to establish new community initiatives for vulnerability reduction.

PUBLICATIONS

•Pont Vidal, J (2018). Gobernanza. La Coordinación Entre Democracia y Jerarquía Dinámica. Ed. Tirant lo Blanch
http://www.tirant.com/editorial/libro/gobernanza-la-coordinacion-entre-democracia-y-jerarquia-dinamica-josep-pont-vidal-9788417203535

•Portocarrero, L., Morato, J. & Vanegas, J.C. 2018. A multicriteria decisión making model for the evaluation of a public investment Project in Medellin: a stakeholder perspective. IJBR, Vol 18, 3.

•Pont Vidal, J (2017). La innovación en la Gestión Pública. Ed. Catarata.
http://www.catarata.org/libro/mostrar/id/1207

CONFERENCES

•2019, 6-7 July. 1st International Summit on Environmental Public Management & Sustainable Development. Huay-Huay District, Valle Dorado, Peru.

•2019, 6-7 March. WSCITECH 2019. Women, Science and Technology Meeting. Terrassa.

•2018, 25-26 October. Congreso Internacional i+es "Proyectos y Experiencias de Innovación con Impacto Social". Universidad CESMAG, Pasto, Colombia.

2. URBAN STRATEGIC PLANNING AND RESILIENCE

The UNESCO Chair supports cities and regions and their stakeholders to establish future lines of urban and regional development through the analysis of opportunities and preparing spatial development visions focused on improvement resilience. To develop such highly participatory strategies, the UNESCO Chair develop in a jointly effort with RECNET network a framework based on co-production and co-design.

Local and regional strategic and adaptive planning based to improve communitary resilience is developed in applied projects.

Efforts are directed to promote **the systemic transition for cities based on co-evolution and social innovation, through just and inclusive participatory processes.** In that sense, we adopt a participatory community development approach, by favouring innovation of socio-ecological systems in order to reduce the vulnerability of local communities and to improve human wellbeing.

3. RISK MANAGEMENT AND COMMUNITARY RESILIENCE IN VILLATINA, MEDELLIN

PARTNERS

- Alcaldía de Medellín
- UNESCOSOST Colombia Joint Office (TDEA-UPC)
- Corporación Camposanto Villatina
- Programa Barcelona Solidaria – Ajuntament Barcelona

UNESCOSOST OBJECTIVE

On September 27, 1987, 20.000 cubic meters of the northeastern slope Cerro Pan de Azúcar in Medellín (Colombia) produced an avalanche that rushed at high speed over the upper part of the Villatina neighborhood (in the Villa Hermosa community) and caused the death of approximately 500 people. The Project was developed on an urban microbasin to promote local development and to improve adaptive capacities of vulnerable communities from the periurban settlements in Medellin, through the establishment of a **model for manage risk from landslide using natural technologies and bioengineering with "guadua" (local bamboo).**

KEY ASPECTS

A demonstrative project to manage river basin was developed by members from the community directed by the engineers from UNESCOSOST using bioengineering techniques such as bamboo stake fences "trinchos", buffer strips and a biofilter to improve water quality.

Social Issues: Strategies used to find solutions. Involve directly affected people in the improvement processes ensures greater commitment and improve the communication between all stakeholders.

ACHIEVEMENTS

Establish the basis to mitigate the environmental risks from landslide using bioengineering.

Promote local development and adaptive capacities of vulnerable communities, strengthening the social fabric by developing participatory processes to develop the community capacities to land management.

A course on bioengineering for sustainable risk management was developed in 2015, with the assistance of

- **40** MEMBERS OF THE COMMUNITY

The course lasted

- **140** HOURS

theoretical and practical, and was aimed at training the community on the bioengineering techniques used for:

- LANDSLIDE RISK MITIGATION
- and for SUSTAINABLE WATER RESOURCES MANAGEMENT

4. MANAGEMENT OF LANDSLIDES IN CORDILLERA SUR, BOGOTA

PARTNERS

•Distrital Institute of Risk and Climate
•Change Management (IDIGER)
Joint Office UNESCOSOST Colombia (TDEA-UPC)
•RECNET
•Bogota Botanical Garden (JBB)

UNESCOSOST OBJECTIVE

By 2011, a mass landslide phenomenon occurred involving the resettlement of hundreds of families living in it. In view of the complexity representing the case for the urban context of the city, the Inter-administrative Cooperation Agreement No. 494 of 2014 were developed, which conceived the implementation of socio -environmental actions for sustainable risk mitigation.

Landslides are a threat throughout many Latin American cities. The poor popultation are the hardest hit, as they tend to live in informal settlements that are perched on steep hillsides on unstable ground. Wealthier people tend to live on safer ground, either closer to the city centre or in high-income suburbs that are less exposed. This pattern is observed in cities around the world. Every year landslides cause loss of life and damage to property in Colombia. People in informal urban settlements are particularly exposed.

The overall objective of the project seeks to **join efforts for the development of socio-environmental actions to facilitate recovery, renaturation and appropriation of territory affected by landslide risk** in the sectors of Cordillera Sur, Tierra Linda, La Cumbre y Zajón of La Estrella, in the town Ciudad Bolivar, in Bogota.

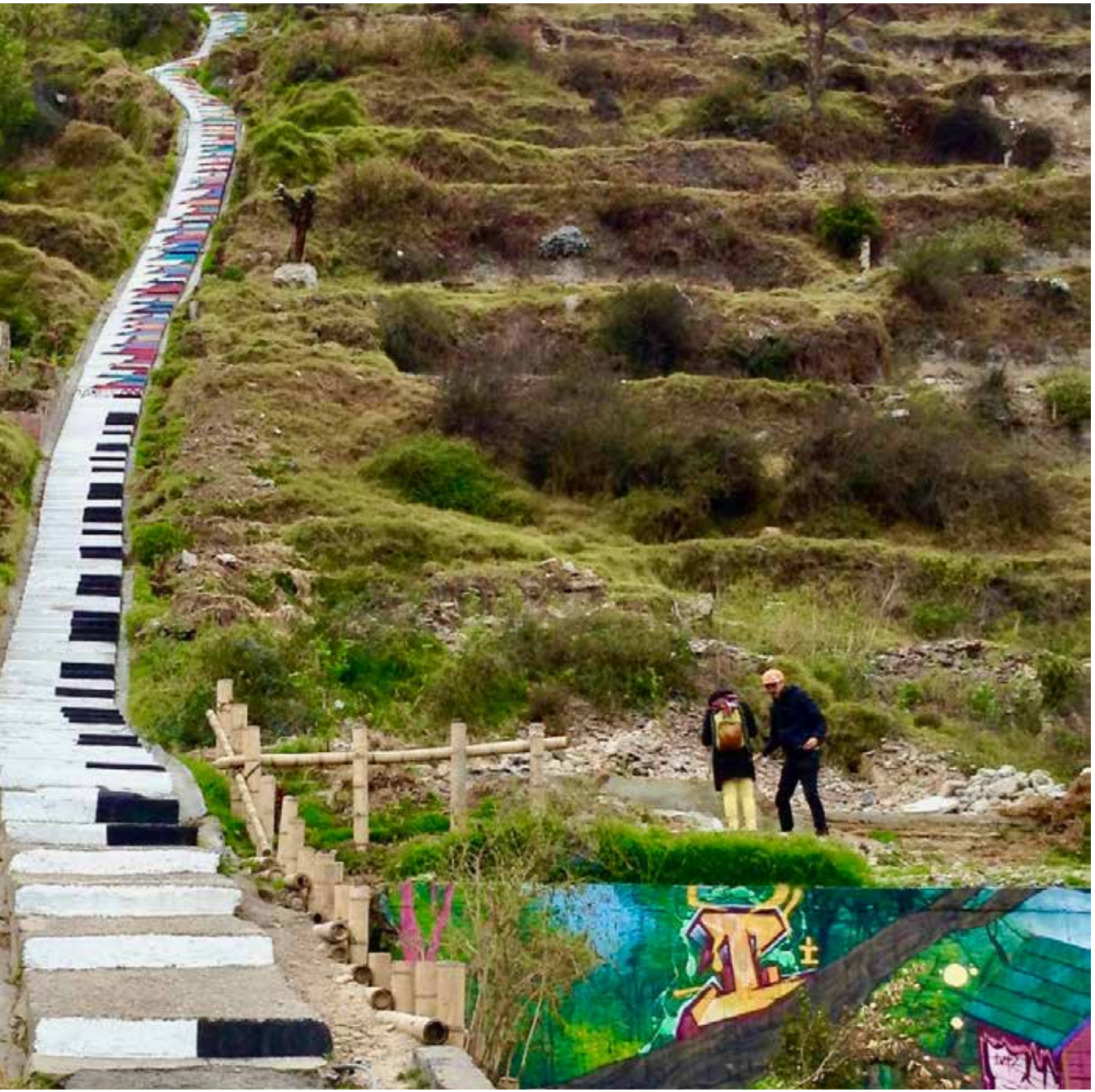
ACHIEVEMENTS

The physical works on site were represented mainly by **bioengineering techniques for the proper management of surface and subsurface waters, ecological restoration of ecosystems in the area, landscaping and renaturation, focused mainly in promoting the social appropriation of the recovered territory,** through outreach, awareness and motivation for communities in the area, so that may help to **mitigate the threat condition and to reduce risk and vulnerability to mass landslides.**

Development of the "Diploma in Agroecology and risk management with citizen participation", a training program with

160 HOURS
of theoretical classroom and applied work that seek to train about

40 PEOPLE IN THE SECTOR
on issues related to the overall sustainability of the territory.



5. ANALYSIS AND EVALUATION OF SUSTAINABILITY IN SOCIAL INTEREST HOUSING PROJECTS IN LATIN AMERICA

Harlem Acevedo
Project Manager - Social Interest Housing

"In view of the thousands of social interest housing projects being carried out in Latin America, the question arises of what these new spaces offer in terms of habitability, well-being and environmental responsibility. In many times, the focus has been more numerical than systemic".

UNESCOSOST OBJECTIVE

The research developed as a PhD Thesis by Harlem Acevedo and financed by COLCIENCIAS, was focused on the evaluation of how sustainable the social interest housing projects in Latin America are, developing a model based onthe impacts of these projects on the residents, the local environment and the territory. The proposed methodology was implemented in Antioquia, Colombia, studying rural and urban housing in socio-environmental fields by analyzing, both quantitatively and qualitatively.

KEY FACTORS

The methodology proposed offers a comprehensive overview of the current state of social interest housing in Latin America and allows for the consideration of its viability in terms of connectivity, urban integration, city creation, environmental impact andsocial resilience. Main key factors are:

The methodology proposed offers a comprehensive overview of the current state of social interest housing in Latin America and allows for the consideration of its viability in terms of connectivity, urban integration, city creation, environmental impact and social resilience. Main key factors are:

- The place characteristics, considering the use of the building land and the level of integration with the municipality and region.
- The materiality and design of the housing, in terms of materials and technology used and the habitability.
- The social and economic component, with special consideration of the ability of these projects to strengthen social, community and participatory schemes.

ACHIEVEMENTS

- A total of 13 social housing complexes from Mexico, Colombia and Brazil were analysed, compared and evaluated with special emphasis placed on the coherence of the legislative guidelines with the materiality of the housing.
- The levels of habitability and sustainability offered by these complexes were measured via satisfaction surveys.
- Technical analysis of the materiality were also developed.

6. TRANSITIONS TO THE SUSTAINABLE AND RESILIENT BUILT ENVIRONMENT

UNESCOSOST OBJECTIVE

In a recent research developed by a Ph.D. candidate Guillermo Penagos, we are studying the **transition towards a sustainable and resilient built environment in Latin American cities from a multilevel perspective.** Considering barriers imposed by the socio-technical regimes, we are identifying existing and potential innovation niches, and routes for a transformative change at the level of policy, education, research and practice are proposed, that may contribute to realize the Sustainable Development ambitions posed by Agenda 2030, the New Urban Agenda, the Paris Agreement on climate change and the Sendai Framework for disaster risk management.

KEY ASPECTS

"A sustainable built environment for a sustainable future"

The building environment plays a central role in satisfying human needs. Shelter, energy, water, sanitation, employment, education, mobility and social interaction require buildings, parks, roads and infrastructures, whose construction and operation mobilize large capital investments, integrating in their value chain the mining, energy, transportation, industry, waste, financial and real estate sectors. On the other hand, the life cycle of such elements has a high metabolic intensity in terms of materials, water, energy, emissions, waste and discharges while affecting ecosystems extension, connectivity and biodiversity. Considering that 75% of humanity will live in cities by 2050, it is urgent to trace and follow routes towards the sustainable and resilient built environment. This is the aim of this project.

ACHIEVEMENTS

- Gaps in terms of policies, scientific research and practice of the built environment that should be addressed are identified.
- A network of connections between the instruments of the global sustainable development agenda are highlighted, allowing to draw roadmaps to comprehensive and resource efficient urban policies at national and local level.

Barriers in sociotechnical regimes that currently block transformational change towards a sustainable and resilient built environment in Latin American cities are identified and potential routes to break some of the most significant barrier are proposed.

7. RESURBE PROGRAM BY RECNET

PARTNERS

•60 organizations worldwide, *coordinated by the RECNET network (Recycling City Network), the UNESCO Chair on Sustainability of the UPC and the University of Southern Denmark (SDU), in collaboration with UN-Habitat and UNISDR.*

UNESCOSOST OBJECTIVE

RESURBE program is an interdisciplinary, multi-sectorial and international open Platform that focuses on promoting research, capacity building and urban development projects worldwide, as well as to support informed policy making, on urban resilience and climate change adaptation/mitigation.

KEY ASPECTS

"In summary, RESURBE efforts are directed to promote the systemic transition for cities based on co-evolution and social innovation, through just and inclusive participatory processes. In that sense, RESURBE adopts a participatory community development approach, by favouring innovation of socio-ecological systems in order to reduce the vulnerability of local communities and to improve human wellbeing", Duvan Hernán Lopez, RECNET President.

ACHIEVEMENTS

3 International Conferences in Barcelona (2014), Bogota (2015) and Mexico (2016).

Co-creation of a common knowledge base. The international conferences were designed in order to facilitate knowledge co-creation and exchange between local and regional governments, universities and research centres, international organizations, grassroots movements and other stakeholders from private and public sectors.

Publication a 7 volume of a "Resilient Cities" Books, signed with Springer Publisher.

CONFERENCES

•2019, 19-23 August. LAC Climate Week. Salvador, Brazil. Presentation from UNESCOSOST Bahia Joint Office: RESURBE: International Program on Urban & Regional Resilience. Cooperation for Systemic transition of cities.

•2018, 13 November. Smart City Expo World Congress. Presentation of the Resilient Cities Series Publications. Barcelona.

TRAINING

•2019, 12-19 September. Bloxhub Summer School on Urban Resilience. Copenhagen, Denmark.

•2019, 8-9 July. La Salle International Summer Academy. Resilient Cities, Rethinking Urban Transformation on the Circular Economy framework. Workshop conducted by Dr. Jordi Morató. Bogota, Colombia.
2018, 9-13 April. Resilience & Climatic Change Course. CELFI. Cordoba, Argentina.

FLAGSHIP PUBLICATIONS

•Brunneta, G., Caldarice, O., Tollin, N., Rosas-Casals, M. & Morató, J. (eds). 2019. Urban resilience for Risk and Adaptation Governance. Theory and Practice. Series Resilient Cities. Springer. 1st ed. 2019, VIII, 304 p.

•Tollin, N., Hamhaber, J. Grafakos, S. & J. Morato. 2017. Sustainable Urbanisation in the Paris Agreement. Comparative review of Nationally Determined Contributions for Urban Content. UNHabitat.

•H. Acevedo. Analysis and Evaluation of Sustainability in social interest housing projects in Latin America. 2017. PhD Thesis. Universitat Politècnica de Catalunya.

•Acevedo, H., Fernando González, L., Pinto Varela, E., Gonzalez Castillo, O., Villasís, R. & J. Morató. 2017. Análisis de sostenibilidad en proyectos de vivienda de interés social en Latinoamérica: una contribución de la investigación universitaria en red. Revista Española de Desarrollo y Cooperación, nº 41, pp. 175-188. Instituto Universitario de Desarrollo y Cooperación.

3. INTANGIBLE CULTURAL HERITAGE

We aim to contribute to the Rescue of Traditional Practices associated with social uses, knowledge, practices, rituals and festive events related to adaptive processes to habitat and nature, and all those knowledge and techniques linked to traditional craftsmanship.

The UNESCO Chair on Sustainability at UPC is developing the research line on Intangible Cultural Heritage through a network of international researchers and collaborators from different regions in México, Colombia, Perú and Ecuador. In all cases, we are directly cooperating with indigenous communities.

The traditional ecological knowledge is the accumulation of knowledge and management carried out by the indigenous peoples, this is expressed both in the use of genetic resources and the modifications they make of the landscape. Both the cultural and the biological component act and manifest themselves in the daily practice and in the worldview of these peoples, being maintained through generations thanks to a value system that promotes the conservation and sustainable use of biodiversity.

We articulate participatory processes to promote sustainable development and community resilience of these communities, but at the same time, trying to work collaboratively to reverse the negative impact of processes such as urbanization, deforestation, mining and hydroelectric projects, among others.

Biodiversity and cultural diversity have had a structural evolution and their process is what has allowed the planet to be habitable. The indigenous populations, especially identify ourselves with two aspects: biodiversity and culture. Under the perspective of indigenous populations, a territory without culture, is a territory without biodiversity, with greater environmental degradation; the more the culture is protected, the greater the conservation of biodiversity, the greater preservation of nature.

FLAGSHIP PROJECTS

•A. RECOVERING INTANGIBLE CULTURAL HERITAGE FROM THE ZENÚ COMMUNITIES

The Zenú culture corresponded to different communities that inhabited the valleys of the Sinú, San Jorge and the Caribbean coasts of the Gulf of Morrosquillo, in the departments of Córdoba and Sucre in Colombia. The Zenú developed 200 years A.C. a hydraulic society that built a series of drainage channels, which allowed them to control floods and adapt large areas for housing and crops.

The project will provide methodologies to improve food security for descendants of the Zenú population, through a development project at the local level using different tools to promote the creation of inclusive and sustainable businesses.

On the other hand, a collaboration with Japanese Cooperation Agency (JICA) was established to improve the worldwide distribution of Zenu handicrafts.

Cultural anthropologists have a huge responsibility in safeguarding the intangible cultural heritage of native peoples worldwide and their traditional knowledge associated with ecosystem management, Angela Maria Moreno Barros, ICH UNESCOSOST Coordinator, PhD Candidate.

•B. TRADITIONAL ECOLOGICAL KNOWLEDGE ASSOCIATED WITH THE ELABORATION OF SIAAB G'EZ

This project financed by CONACYT, tries to identify the cultural practices and traditional ecological knowledge associated with the elaboration of Siaab g'ez, a traditional drink of the Zapotec community of Teotitlán del Valle, Oaxaca, Mexico.

The research will determine the socio-cultural aspects linked to the preparation and consumption of Siaab g'ez in the community of Teotitlán del Valle, describing the process of making white or rotten cocoa and defining the agroecological, ethnobotanical and historical environmental background of Theobroma bicolor Humb. & Bonpl. in the Soconusco region of Chiapas.

"... we want and need to re-plant pataxte trees, with them we would reach our lives to see and reap their fruits ..." Martín Álvarez (Cocoa Producer, 65 years old)

The preservation of gastronomy and local rituality, expressions of the Intangible Cultural Heritage, largely guarantee the conservation of local and regional biodiversity on which these cultural manifestations depend, Carmen Sandoval, PhD researcher from the UNESCO Chair on Sustainability.

•C. ECONOMIC, SOCIOCULTURAL & ENVIRONMENTAL STUDY OF SOTOL, DRINK FROM THE LAGUNERA REGION, MEXICO

This research work aims to know the environmental, economic and social aspects, which link the development of Sotol, a traditional drink from the Lagunera region (Mexico), demonstrating the importance of transdisciplinary studies, from the perspective of sustainability, to achieve the sustainable development of the Sotol product. Sotol is a plant that offers several ecosystem services, the one that stands out the most is the distillate with the same name, whose elaboration is loaded with knowledge related to the preservation of species, processing techniques, uses of distillate and traditions linked to it, remarks Ruth Villalobos, PhD researcher from the UNESCO Chair.

"the importance of a legal framework in the development of sotol is that its application allows the correct exercise of cultural rights through the preservation of techniques and elaboration and the customs associated with the distilling product".

•D. SOVEREIGNTY OF INDIGENOUS KNOWLEDGE IN THE COLOMBIAN AMAZON – THE ANDOKE VILLAGE OF ADUCHE

Indigenous communities have a traditional knowledge about the use of biodiversity transmitted after years of trial and error, with an "ecological" methodology to make use of everything around us, animals, food, the spiritual. The history, social organization and behavior of the Andoke People of Aduche was analyzed as an example of indigenous community who have achieved their cultural survival, guaranteeing the conservation of nature and cooperation with their own sustainable production activity. This research has postulated the recognition of a matrix of origin of the Po'osié **people,** with original concepts that are based on a Law of Origin linked strongly to their own cosmovision, a word of government and authority (Yetara Uai / Ka'takadi

pisei - Yetárafue / Yohafise) **where coexistence with nature is the fundamental factor,** which allows the ancestral history to be remembered and reconstructed daily.

As indigenous peoples we are a collective subject with an intrinsic relationship to the environment where we live, Lena Yanina Estrada Añokazi, PD.

The project is developed among other partners in collaboration from the Grupo de investigación Historia, Ambiente y Política -HIAMPOL- Historia Ambiental, Ecología Política y Geografía Histórica, from the Universidad Nacional de Colombia – Sede Amazonia and other partners.

"Nothing has a price,
there is no money that can
pay for this we have taken care of,
belongs to everyone
nobody can take over things,
The land belongs to everyone,
the water belongs to everyone
When we say: the earth is not worth it,
water is not worth ...
it's because there is such a great price
that there is no money in this world that can afford that,
for that reason that belongs to everyone,
it is a service for everyone.
That is the essence of life. "

Jiyeroña Kudo
Traditional doctor

•E. TRADITIONAL ECOLOGICAL KNOWLEDGE (TEK) IN FAMILY AGRICULTURAL SYSTEMS, TOWARDS FOOD SOVEREIGNTY

The research financed by CONACYT identifies the practices and traditional ecological knowledge that women have in family agricultural systems in San José del Rincón, Puebla, Mexico, and developed through long periods of time and interaction between the human being and the natural environment and the way they are kept alive through oral transmission in a generational way. The participation of women in rural areas is fundamental as an active part of the preservation, maintenance of diversity, both of natural resources, and of the care and attention of the family nucleus of rural areas. The family agricultural systems that are characterized by a high diversity of crops, use of their own inputs, less use of fertilizers and pesticides of agrochemical origin and reproduction of seeds of traditional varieties or "Creoles", clearly promote food sovereignty.

Thanks to the production of food in family farming systems (SAF) on a small scale and the continuity of Traditional Ecological Knowledge practices within them, it is possible to protect and reproduce genetic diversity and biocultural memory associated with food, Ana Gladys Ramirez, PhD Candidate.

The problem now is that youth is different, they have already dedicated themselves better to the city, my children no longer want to work in the field", says Francisco Tepoz.

CONFERENCES

•2018, 22 November. 1st Forum on Cultural Heritage, Biodiversity and Resilience was held at the Palau Robert (Barcelona), with the support of the consulates from Colombia and Mexico in Barcelona and the presence of Ruth Mary Vega, leader from the Zenú artisan community in Colombia. Ruth Mary Vega represents CORPOMEXION, entity where more than 600 families of artisans from the Zenú ethnic group, at the department of Córdoba, and with 10 years of experience in the consolidation of Resilience and Development strategies through the crafts. The forum has highlighted the need to link efforts to safeguard the Intangible Cultural Heritage of native peoples.

•2018, 24-25 October. Waters that Unite: Rivers in Colombia, an Interdisciplinary Look. Montería, Colombia. Organized by the Cultural Center of the Bank of the Republic in Monteria, and with the co-organization of RECNET.

•2018, 11 September. The first settlers - History of Senú annual conference. Montería, Colombia. Organized by the Bank of the Republic with the support of the UNESCO Chair on Sustainability, the Master of Social Sciences at the University of Córdoba and Caribe Vivo Foundation. Place: Multiple room of the Cultural Center - Bank of the Republic, Montería.

•2018, 3-8 September. 2nd Interdisciplinary Meeting of Knowledge, Archives and Photographic Collections "Knowledge in Motion (ISAYAF), at the University of Córdoba, organized by the Caribe Vivo Foundation and the Úvendor Foundation, with the support of the UNESCO Chair on Sustainability at the UPC, the Orlando Fals Borda Documentation Center at the Cultural Area of the Bank of the Republic, the Master of Social Sciences from the University of Córdoba and different cultural entities from Cereté and Montería.

•The UNESCO Chair on Sustainability at the UPC awarded two scholarships for photographic research on Intangible Cultural Heritage for the plastic artist Iván Leonardo López Martínez and the student of the fifth semester of the Social Sciences Degree from the University of Córdoba, Julissa María Páez, for their contributions in the collection of ethnographic and documentary photography of the Embera-Katio community from Alto Sinú. Montería, Colombia.

TRAINING

•2018, 19 November. Workshop by Juan Sánchez, time for woman, time for water. UNESCO Chair on Sustainability. Campus UPC. Terrassa, Barcelona. Juan Sanchez is teaching at the North Carolina Asheville University and is the 2016 recipient of the 34th National Literature Prize of the UdeA National Culture Awards (Colombia) in Poetry mode.

FLAGSHIP PUBLICATIONS

•2018, 12 September. PhD thesis "Sovereignty of Traditional Indigenous Knowledge in the Colombian Amazon - The Andoke People of Aduche". Lena Yanina Estrada Añokazi. Directed by Professor Xavier Alvarez from the UNESCO Chair on Sustainability of the UPC.

4. APPROPRIATE TECHNOLOGIES & BIOENGINEERING

UNESCOSOST is developing an innovative approach integrating research, knowledge generation, capacity building and global cooperation to promote innovative technologies to meet social, environmental and economic needs.

We are working in research related to the planning and designing of local and regional space through a mat of multifunctional networks of ecoinfrastructures and settlements with zero carbon emissions, ensuring sustainable management of ecosystem services, with emphasis on the management of water resources at the basin level.

The UNESCO Chair has great knowledge about the use and application of nature based solutions, appropriate low-cost or social technologies for water management (urban or rural), to increase the well-being of communities and the capacity to produce goods and services. Different constructed or treatment wetlands, buffer strips, sustainable urban drainage systems and other appropriate technologies are designed, developed and constructed at different scales, in a water sensitive urban design framework.

Ecotechnologies and nature-based solutions contribute to minimize the impacts generated to the environment derived from human activity through the recovery, restoration and expansion of ecosystems.

8. LIFE REAGRITECH: REUSE OF AGRICULTURAL RUNOFF FOR NITRATE REMOVAL

PARTNERS

•TYPSA, Leitat Technological Center and UNESCO Chair on Sustainability.

UNESCOSOST OBJECTIVE

The LIFE project REAGRITECH (Regeneration and reuse of runoff and drainage water in agricultural plots by combined naturally water treatment systems) was implemented from 2013 to 2016, in order to minimize the impacts of nitrate pollution from agriculture runoff. A demonstrative pilot system was designed, combining two appropriate water treatment natural technologies: constructed wetlands and buffer strips. The treated effluent was reused for crop irrigation or incorporated into the riverbed or recharged the aquifer in the area.

Between 50-80% of nitrogen present in the water is contributed by the runoff from the agriculture. This pollution has caused a sharp increase of nitrate vulnerable zones (detected nitrate concentrations above 50 mg L-1). 41.4% of the territory of the EU27 has been declared as nitrate vulnerable zones (Eurostat, 2006).

ACHIEVEMENTS

Cork by-product from the winery industry has shown clear adsorbent properties to remove organic pollutants. A significant higher removal in treatment wetland using cork was observed, achieving a removal rate from

80 TO 99%.

Both physicochemical and microbial results were consistent and confirm that cork could be an alternative material used by treatment wetlands to minimize the impact in the environment caused by nitrogen pollution in groundwater bodies.

The combined treatment system successfully reduce pollution from nitrates and pesticides in surface waters and groundwater associated with agricultural activities, but also will bring benefits to the agriculture affected areas, as it will allow the recovery, restoration and expansion of the area occupied by riparian and aquatic ecosystems, thereby reducing eutrophication of surface waters, favoring the proliferation of native species.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9. ECOTECHNOLOGIES FOR RISK AND VULNERABILITY REDUCTION IN DRINKING WATER SYSTEMS IN THE CAUCA REGION (COLOMBIA) - AQUARISC PROJECT

PARTNERS

•Gobernación del Cauca
•Universidad del Valle (CINARA)
•Cátedra UNESCO de Sostenibilidad
•Corporación Autónoma Regional del Cauca (CRC)
•Clúster CreaTIC
•EMCASERVICIOS
•Centro Regional de Productividad e Innovación del Cauca (CREPIC)
•Municipalities from La Sierra, Patía •Timbio, Cajibio, Popoyan, Bolivar, Mercaderes, Suarez and Santander de Quilichao

UNESCOSOST OBJECTIVE

National assessments on water resource systems in Colombia, show a high-level of vulnerability on the maintenance of current water availability. According to general estimates for medium hydrological conditions, about 50% of the municipal urban population is exposed to water supply issues. The situation becomes more critical in dry years when the percentage arrives to an 80%. According to IDEAM-Colombia, without proper conservation and management measures for 2015 and 2025 respectively, 66% and 69% of Colombians will be at high risk of shortages in dry hydrological conditions.

The main objective of AQUARISC is to strengthen decision-making tools and mechanisms from the local authorities and institutions that are related to water supply for human consumption, considering the effects of meteorological variability and climate change. The project also targets the sustainable development of the Cauca, the well-being of its communities and the materialization of 2016-2019 development plans, which will directly benefit near 349 thousand people that live in the main municipalities of the Cauca Department.

ACHIEVEMENT

Design and construction of different eco-technology prototypes to

OPTIMIZE WATER TREATMENT SYSTEMS

and resource protection were carried out in

5 LOCAL MUNICIPALITIES

at the Cauca Region. Social appropriation and technology transfer strategies through participatory environmental processes to strengthen bonds between different stakeholders.


recnet

10. SUSTAINABLE MANAGEMENT OF CORK WASTE AND TREATMENT OF EFFLUENTS FROM THE WINE SECTOR WITH CORK WASTE – PROJECT LIFE ECORKWASTE

UNESCOSOST OBJECTIVE

The cork sector currently generates a high amount of by-products that can not be used in the manufacture of cork stoppers, which ultimately goes directly to landfills. The LIFE Ecorkwaste project (LIFE14 ENV/ES/460), co-financed by the EU and developed from 2015 to 2018, aims to demonstrate the feasibility of valuing cork waste not currently used for the treatment of wastewater in the wine sector, through a treatment wetland.

ACHIEVEMENT

Demonstrate at pilot scale the feasibility of an innovative hybrid treatment wetland system based on the use of cork wastes, as granular media, for the treatment and reclamation of agroindustrial wastewater (winery wastewaters). The wetland plants will eliminate BDO5 and the cork waste will absorb the recalcitrant organic compounds (polyphenols) of the wastewater. To demonstrate at pilot scale, the use of cork waste as adequate substrate for syngas production by gasification in fluidised bed.

"In the LIFE Ecorkwaste project, the Polytechnic University of Catalonia and the Codorniu winery have designed and test the first system in the world that uses cork to purify the winery wastewater and obtain renewable energies".

Dr. Jordi Morató, Technical Director of the Ecorkwaste Project.

11. STRENGTHENING OF TECHNICAL CAPACITIES TO IMPROVE THE WATER AND SANITARY SERVICE IN THE MUNICIPALITY OF ANTA, PERU

PARTNERS

•Diputació de Barcelona, Municipality of Anta, UNALM (Perú), UNESCOSOST.

UNESCOSOST OBJECTIVE

The population of Izcuchaca - Anta is served by the Sanitation Services Management Unit administered by the Municipality of Anta, with 2,500 registered users and a total population according to INEI 2007 of 12,000 inhabitants. The commercial center of the city has continuous service while the peripheral areas have service restrictions - only for 2 hours- and almost 30% of localities do not have access to drinking water and it is supplied in containers supported by a motor-lift. **The project developed during 2016, aims to strengthen local technical capacities for the improvement of water and sanitation management in the Municipality of Anta.**

KEY ASPECTS

A determining factor is the age of the water distribution system of more than 40 years without any maintenance and intervention (there are no control valves). On the other hand, the town of Izcuchaca (Anta) has no wastewater treatment, which is discharged directly into the Hatunmayo river and through the city, revealing the disarticulation of the planning and territorial planning processes with nature, denoting a high vulnerability to water quality and water regulation of the soil-vegetation system.

The curiosity and motivation of children and young people are the best tool for water conservation and care. Therefore, the participation of the educational community guarantees the success of nature-based solutions for sanitation in high Andean schools, Rosario Pastor, Responsible for Strategic Projects, UNESCOSOST.

ACHIEVEMENTS

- **Update of the Operational Plan for Water and Sanitation (POAS).**
- **Training and exchange of experiences with researchers of UNALM-UNESCOSOST / UPC to develop the construction project of a demonstration plant for the treatment of domestic wastewater in the town of Izcuchaca.**
- **Generate strategic alliances with institutions and entities managing the water resources (RH) to consolidate the awareness program in environmental education in schools of Anta and Olesa de Montserrat.**

12. BIOFILTRATION WITH CORK AND MORINGA OLEIFERA TO REMOVE MICROBIAL POLLUTANTS

PARTNERS

•CINVESTAV, Univ. Autonoma de Barcelona

UNESCOSOST OBJECTIVE

In collaboration with CINVESTAV from Mexico, the evaluation of a functionalized cork biofiltration system with a natural extract of M. oleifera seed was tested for the removal of Escherichia coli, as a pathogenic microorganism indicating the quality of wastewater.

ACHIEVEMENT

To confirm the efficiency of the treatment system, a molecular technique was initially standardized, real-time viability PCR with a specific gene (LacZ) present in E. coli, isolated from the wastewater of one of the City's Xochimilco channels from Mexico.

Viability PCR real time is an innovative molecular technique that allows the differentiation between living and dead microorganisms, based on the loss of integrity of the cell membrane in dead cells.

The continuity of the molecular technique will be tested with the purpose of evaluating the water quality of the channels of the Chinampera Zone, where several bioremediation technologies are conducted, directed by Dr. Refugio Rodríguez Vázquez and his research group of the CINVESTAV.

CONFERENCES

•2018, 31 oct to November 1st. Ecotechnologies and Nature Based Solutions for local and regional development. International Workshop. Montería, Cordoba, Colombia. Universidad Pontificia Bolivariana and UNESCOSOST.

•2018, 19-21 September. 1st Ecotechnologies Workshop in Cauca, Colombia - Aquarisc Project. Popayan, Cauca, Colombia. UNIAUTONOMA and UNESCOSOST.

•2018, 24-25 May. 1st Meeting "Water for Human Settlements". Headquarters of UNESCO, Paris, France. With the participation of the UNESCO Chair on Sustainability and the RECNET network. During the meeting, the Nairobi Matrix, the UNESCO strategic plan on Human Settlements for the next 4 years has been discussed and worked on the new elements that will have to be incorporated during the next years.

•2018, 15-18 May. IV Pan-American Conference on Wetland Systems. National Agrarian University La Molina and UNESCO Chair on Sustainability (Coorganizer). Lima, Perú. Keynote presentation by Dr. Jordi Morató. "Appropriate Technologies and Wetlands of Treatment within the framework of the Circular Economy".

FLAGSHIP PUBLICATIONS

•Castellar, J.A.C, Formosa, J., Fernández, A.I., Jové, P., González, M., Morató, J., Brix, H & C. Arias. 2019. Cork as a sustainable carbon source for nature-based solutions treating hydroponic wastewaters. Science of the Total Environment, 650:267-276.

•Aguilar, L., Gallegos, A., Arias, C.A., Ferrera, I., Sanchez, O., Rubio, R., Ben Saad, M., Missagia, B., Caro, P., Sahuquillo, S., Perez, C. & J. Morató. 2019. Microbial nitrate removal efficiency in groundwater polluted from agricultural activities with hybrid cork treatment wetlands. Science of the Total Environment, 653: 723-734.

•Aguilar, L., Gallegos, A., Arias, C.A. and J. Morató. 2018. REAGRITECH Project: Regeneration and Reuse of Runoff and Drainage Water from Agriculture by Treatment Wetlands, in Artificial or Constructed Wetlands, a Suitable Technology for Sustainable Water Management, CRC Press. Eds. María del Carmen Durán-Domínguez-de-Bazúa, Amado Enrique Navarro-Frómeta, Josep M. Bayona. ISBN 9781138739185.

•Castellar, J., Arias, C.A., Carvalho, P., Rysulova, M., Montserrat, J., Pérez, G., Bosch, M., Morató, J. 2018. "WETWALL" — an innovative design concept for the treatment of wastewater at an urban scale. Desalination and Water Treatment, 109, 205-220.

•Acosta, C.P., Codony, F., Fittipaldi, M., Hernán, C. & J. Morató. 2018. Monitoring levels of viable Helicobacter pylori in Surface water by qPCR in Northeast Spain. J. Water & Health, 16.5, 839-845.

•Adrados, B., Arias, C. A., Pérez, L.M., Codony, F., Bécares, E., Brix, H. & J. Morató. •2018. Comparison of removal efficiency of pathogenic microbes in four types of wastewater treatment systems in Denmark. Ecological Engineering 124:1–6

•Jiméne, Y., Delgado, L., Fernández, C., Pino, H., Casas J.C., Madera, C.A., Lara, J., Morató, J. & E. Rengifo. Rev. U.D.C.A Act. & Div. Cient. 21(2): 543-552.

•Tello, W., Matías, L., Loureiro, D.B., Morató, J. & Martín L. 2018. Evaluation of the autochthonous free-floating macrophyte Salvinia biloba Raddi for use in the phytoremediation of water contaminated with lead, Desalination and Water Treatment, 103, 282-289.

•Ben Saad, M., Aguilar, L., Gallegos, A., Missagia, B., Rubio. R., Ben Said, M., Arias, C.A., Ghrabi, A. and J. Morató. Reagritech: A relevant Model of sustainable water management, pp 61-64. In Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions. Proceedings of Euro-Mediterranean Conference for Environmental Integration (EMCEI-1), Tunisia. Springer.

•Nascimento, F.R., Kiperstok, A., Martín, J., Morató, J. And E. Cohim. 2018. Decision support system for management of reactive nitrogen flows in wastewater system. Environmental Science and Pollution Research (2018) 25:8644–8653

•Garcia, L., Petkova, P., Margalef-Martí, R., Vlves, M., Aguilar, L., Gallegos, A., Francesko, A., Perelshtein, I., Gedanken, A., Mendoza, E., Casas-Zapata, J.C., Morató, J. & Tzanov, T. 2017. Hybrid Chitosan−Silver Nanoparticles Enzymatically Embedded on Cork Filter Material for Water Disinfection, Ind. Eng. Chem. Res., 56,13, 3599-3506.

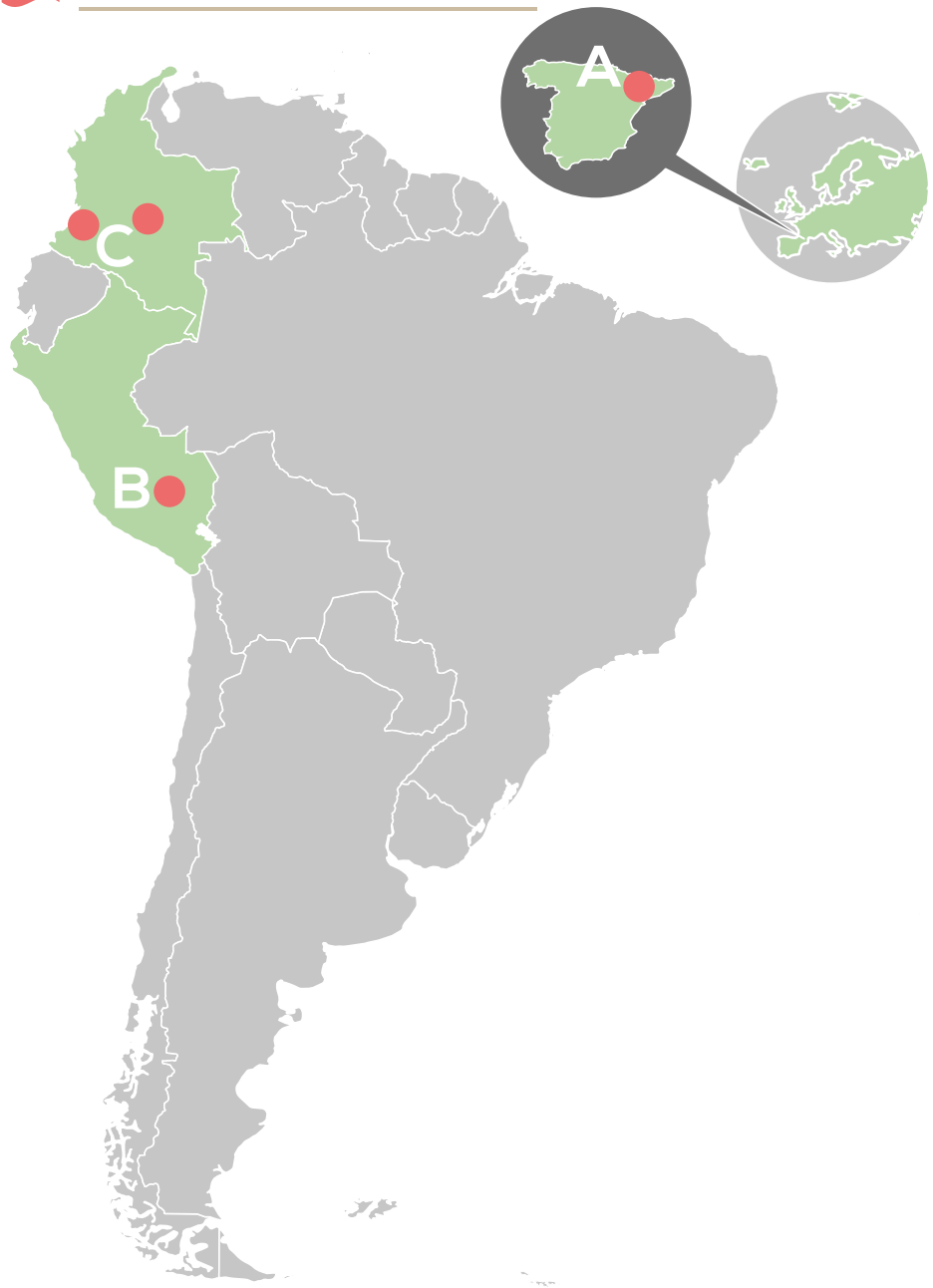
5. CIRCULAR ECONOMY

In recent years, the Circular Economy has been receiving growing attention among policy makers and business leaders, becoming a priority in the policies of the European Union.

Innovation is the key element to achieve the transition to a Circular Economy. New technologies, processes, services and business models will be necessary, as well as the integral change in consumer behavior patterns. Managing all these changes requires administrations and companies to have data and information for decision-making and resource allocation. But in many cases this information is still not available or is fragmented. Most efforts will be directed during next years to improve the knowledge generation and transfer related to circular economy.

"The Circular Economy is presented as an alternative to the current model of production and consumption, with the potential to solve environmental challenges, while opening up business opportunities and economic growth", Jordi Morató, coordinator UNESCO Chair on Sustainability.

FLAGSHIP PROJECTS



•A. SUSTAINABLE MANAGEMENT OF CORK WASTE AND TREATMENT OF EFFLUENTS FROM THE WINE SECTOR WITH CORK WASTE – PROJECT LIFE ECORKWASTE

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To demonstrate at pilot scale the feasibility of an innovative hybrid treatment wetland system based on the use of cork wastes, as granular media, for the treatment and reclamation of agroindustrial wastewater (winery wastewaters). The wetland plants will eliminate BDO5 and the cork waste will absorb the recalcitrant organic compounds (polyphenols) of the wastewater. To demonstrate at pilot scale, the use of cork waste as adequate substrate for syngas production by gasification in fluidised bed.

•B. STRENGTHENING THE SEGREGATION AND SELECTIVE WASTE COLLECTION PROGRAM IN THE PROVINCIAL MUNICIPALITY OF ANTA-CUZCO, PERU

The project RESDIBA I and RESIDBA II addresses the segregation at source and the selective collection of urban solid waste in the province of Anta, considering that in Peru this activity is carried out predominantly informally. Therefore, one of the key actions of the proposal is the formalization of waste pickers and will be emphasized in the framework of the 29419 law that provides tools to initiate processes for the formalization of waste pickers in each of the 9 districts of the province of Anta.

Low cost plastic wood: new life to plastics. Paulo Gomes, visiting professor from the Federal University of Bahia (Brazil) and co-director of UNESCOS Bahia, manufactured a bar with recycled plastics that could be an alternative to the use of wood, during his stage in the UNESCO Chair. Main characteristics of the project are the development of low-cost and accessible technologies for communitary use. The project was designed for use in any slum or "favela" neighborhood. "The idea is to make low-cost machines, affordable for anyone, to transform packaging plastics in any piece of interest to community", Paulo Gomes, UNESCOSOST Bahia.

•C. CIRCULAR ECONOMY OF COFFEE AND BANANA

The promotion of the Circular Economy from the use of agricultural by-products such as coffee or banana, within the post-conflict framework in Colombia, has been the theme chosen by the student of the Master's in Sustainability, Felipe Murillo, who has carried out in the framework of the AQUARISC Project and coordinated by PhD Jordi Morató, coordinator of the UNESCO Chair on Sustainability.

The project has been developed in El Castillo (Meta) and in Cajibio (Cauca), based on two model companies. In El Castillo, the Asodeleite microenterprise (Mussa), made up of post-conflict people in charge of the generation of multiple products based on bananas, such as banana liqueur and tortillas.

In Cajibio the work has been developed within the framework of the AQUARISC Project, financed by the General System of Royalties (CTI) with the Technology & Innovation Park Tecnicafé, and in collaboration with the company SUPRACAFE.

CONFERENCES

•2019, 13-14 May. UNESCO Water Conference 2019. UNESCO, París.

•2018, 28 November. Presentation of UNESCO Chair on Sustainability projects on Circular Economy, in the ¿Circular or Spiral Economy? Towards a closed metabolism, organized by ASYPS. CONAMA Conference. Madrid.

•2018, 12-14, September. XVIII International Congress on Integral Waste Management. Barranquilla, Colombia.

FLAGSHIP PUBLICATIONS

•2019. Situación y Evaluación de la Economía Circular en España. Fundación COTEC para la innovación.

•2017. Situación y Evaluación de la Economía Circular en España. Fundación COTEC para la innovación. ISBN 978-84-92933-35-8.

6. ECOSYSTEMIC SERVICES & RESOURCES SUSTAINABLE MANAGEMENT

Analysis of the national policies and regulatory framework in different countries were carried out in order to assess the established conditions for the management and impacts on ecosystems and related ecosystem services. The UNESCOSOST provide several conceptual bases for:

•development of integrated ecosystem management approach.

•appropriate development of recommendations to the national authorities for improvement of rural development policies.

•strengthening of the legal systems for ecosystem management.

Most efforts will be directed during next years to improve the knowledge generation and transfer related to adaptation and mitigation to climate change and ecosystem services and their relation with intangible heritage, in a holistic approach to global change focused on four main areas of work: water, energy, land and biodiversity.

FLAGSHIP PROJECTS

•INCORPORATION OF THE ECOSYSTEM SERVICES VALUATION IN URBAN – REGIONAL ENVIRONMENTAL SUSTA INABILITY POLICIES. MEDELLÍN, VALLE DE ABURRÁ Y LA REGIÓN CENTRAL DE ANTIOQUIA

PhD Thesis from Alejandro González. The interdependence relationship among cities (Medellin and its Metropolitan Area) was analyzed, as an expression of urbanization process, as well as all its dynamics with the regions that provide them with different goods and ecosystemic services and without which cities could not survive. After the analysis of that dependencies, a proposal to incorporate the valuation (not only economic) of ecosystemic services in urban policies, including different urban planning tools will be developed.

Territories can no longer be analyzed and managed in isolation. On the contrary, they must be analyzed as urban-regional environments, since there is a permanent exchange or flow of goods and services that nature provides. In most cases that ecosystemic services are rarely identified, valued and incorporated.

•IMPLEMENTATION OF NATURAL WATER TREATMENT SYSTEMS TO REDUCE CLIMATE VULNERABILITY IN WATERSHEDS IN LATIN AMERICA. PHD THESIS BY DANIELA AVILA

The main objective is directed to design and apply a protocol for the implementation of natural water treatment systems from a watershed approach, based on local capacities and the analysis of ecosystem services to reduce climate vulnerability in Latin America. The implementation protocol wil be tested in two different hydric river basin from Colombia and Mexico. The research was focused to strengthen sustainable water treatment mechanisms, tools and systems, with the purpose of improving decision making and moving towards the provision of the supply service with quantity, quality and continuity.

•INTEGRATION OF ECOSYSTEM SERVICES IN SUSTAINABLE TOURISM IN THE MONTES AZULES BIOSPHERE RESERVE, CHIAPAS, MEXICO. PHD THESIS BY DIANA MONZÓN

The research combine in a sustainable way the tourism activities with nature conservation, through the implementation and adaptation of sustainable strategies, considering the Cultural Heritage from the indigenous communities and how that knowledge can be incorporated.

CONFERENCES

2019, 6-7 July. 1st International Summit on Public Management and Sustainable Development. Huay-Huay District, Perú. Coorganized by UNESCOSOST. The commitment signed during the Summit guarantees the follow-up of this international event. The UNESCO Sustainability Chair has signed a collaboration agreement with the Vice-Minister of the Forest Conservation Institute (ICF) of Honduras, and the Huay-Huay mayor, Teodosio Zacarias Collachagua, to encourage networking and joint projects.

2018, 15-19 October. Ecosystem Services Partnership European Regional Conference. San Sebastian, Spain. Presentation of Natural water treatment systems and ecosystem services in watersheds of the Cauca Department, Colombia", by PhD student Daniela Avila. Training

2018, 1-2 February. Training for Managers in Ecological-Water Community Resilience Workshop. Montería, Colombia. Organized by the UNESCO Chair on Sustainability at UPC in collaboration with the University of Córdoba, the Universidad Pontificia Bolivariana Seccional Montería and the Cultural Area of the Banco de la República Sectional Montería.

FLAGSHIP PUBLICATIONS

•Benjumea Hoyos. et. al. (2017) Estado del recurso hídrico en Antioquia 2013 -2016. Compilación. Medellín, Colombia: CTA.

NEWS

Francisco Javier Escalante, Forestry Engineer with specialty in integrated river basin management, and Vice Minister of Forestry Development at the Forest Conservation Institute (ICF), from the Government of Honduras, joins this August as one of the expert researcher-collaborators in the UNESCOSOST network. The UNESCO Chair on Sustainability at the UPC signed a collaboration agreement with ICF.

CAPACITY BUILDING

1. ACADEMIC – UPC

Efforts are directed to **different educational degrees, including undergraduate, postgraduate (master and PhD),** and continuous training. An important part of the undergraduate training is centred on the School of Industrial, Aerospace and Audiovisual Engineering of Terrassa (ESEIAAT), at Campus UPC-Terrassa, with approx. 500 students per year.

Master's degree in Sustainability Science and Technology. A total of 35 Master Thesis (5 students/year) have been directed along this period (2011-2016) by faculty members of the UNESCO Chair on Sustainability.

Sustainability PhD program has been completed by 863 professionals along its 17 editions, with an **average of 50 students enrolled for every academic year.** PhD Thesis that have been coordinated and presented by faculty members of the UNESCO Chair on Sustainability, in the past six years, amount to an average of **3 students per year and a total of 17 Thesis have been finished in this period (2011-2016).**

2. LOCAL CAPACITY BUILDING PROGRAM

UNESCO Chair on Sustainability is **supporting cities and regions and all stakeholders involved in establishing future lines of urban and regional development** through the analysis of risks and opportunities and preparing **spatial development visions based on the SDG.** Work is developed in networks like RECNET, in order to develop highly participatory strategies, based on the co-production and co-design of solutions.

Most capacity building is developed from the implementation of transformation projects. During the last 10 years, the Chair has participated in the design, development and management of interventions for the overall improvement of neighbourhoods in Colombia, Mexico, Peru and Brazil. The **"Altos de la Estancia" project in Ciudad Bolivar (Bogota, Colombia) was selected on 2015 among the top 20 global risk management initiatives (Sendai Summit, 2015).**

We are working on **research related to the planning and design of local and regional places through a multifunctional network of ecoinfrastructures and settlements with zero carbon emissions,** ensuring sustainable management of ecosystem services, with emphasis on the **management of water resources at the basin level.** A considerable knowledge about the **use and application of appropriate low-cost or social technologies for water management (urban or rural) is produced, to increase the well-being of communities.**

3. GLOBAL INTERNSHIP PROGRAM

All these work at the local and regional scale is made with the close collaboration of different partners from many universities, NGOs, Public Administrations and even the private sector. All these efforts are supported today with the important contribution of our Joint Offices, undertaking several activities in Colombia, Brazil, Peru, Argentina, Ecuador and Mexico.

INTERNATIONAL NETWORK

The UNESCO Chair on Sustainability has developed a **network of offices and support teams in a variety of strategic countries (UNESCOSOST Joint Offices Network)** through collaboration agreements between Universities. The joint offices directly manage the projects derived from the different agreements and international cooperation promoted by the UNESCO Chair of Sustainability at the UPC.

recnet.

www.recitynet.org

The RECNET network currently comprises more than 60 organizations from 27 different countries. Our members are centred in re-thinking the transformation of cities for sustainable transition to more resilient socio-ecological systems.

RECNET focuses on four main areas of work (energy, water, land and biodiversity), targeted at key challenges that need to be in constant innovation and research:

•adaptation and mitigation of climate change.

•Intangible heritage.

•Green and circular economy.
To complete this achievements, RECNET design and apply diverse tools:

•Create a network of institutions for the development of social innovation.

•Reduce the environmental impact of cities through the promotion of appropriate mechanisms for social participation.

•Promotion of development through transfer of experiences.

•Implement socio-environmental and awareness activities.

•Link and articulate the empowerment of all stakeholders.

THE TEAM

ONE TEAM. TODAY'S EXPERTISE IN ACTION FOR TRANSFORMATION MULTIDISCIPLINARY TEAM WITH MORE THAN 30 PEOPLE WITH SKILLS THAT COVER A WIDE RANGE OF DOMAINS AT A TECHNICAL AND SOCIAL LEVEL.

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VULNERABILITIES
EDUCATION
LE CULTURAL HERITAGE
NATURE BASED SOLUTIONS
INNOVATION
COMMUNITARY
SUSTAIN
MATION
CAPACIT
COLLABORATION
INTANGIBLE