



Enhancing Scientific Cooperation between the European Union and Central America

Fortaleciendo la cooperación científica entre la Unión Europea y América Central



ENLACE Experts' Dialogue Workshops

**Central American S&T Priorities
Match Making Statement**



ENLACE (Enhancing Scientific Cooperation between the European Union and Central America) is a project co-funded by the European Commission in its 7th Framework Programme under the Grant Agreement no 244468 running from 1st Nov. 2009 to 30th Oct. 2013.





**ENLACE
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Priorities
Match
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Central American S&T Priorities Match Making Statement

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ENLACE Experts' Dialogue Workshops: Priorities Match Making Statement

1. EXECUTIVE SUMMARY

As part of the main activities of WP2, which adopts a bottom-up approach to identify common research lines among the Central America and the EU, a priorities match making exercise has been run resulting from the various the dialogue workshops held during the ENLACE project. The present document gives account of the main results that stemmed from these dialogue workshops in terms of common priorities.

The document intends to summarize the main outcomes as well as the process and methodologies used to obtain research lines relevant to the main Joint Initiative for Research and Innovation (JIRI). Several key outcomes, thematic conclusions, key stakeholders lists issued from each dialogue as well as some concluding reflections are also presented. Furthermore, after the dialogue events, the exercise to link research lines to the identified sub-themes highlighted by the EU-LAC Senior Official Meeting Working Group is presented on thematic cross-matrixes respectively. All these outcomes aim to further feed the S&T policy dialogue events and future S&T EU-Central America cooperation activities.

The complete proceedings of the Workshops organized by ENLACE, on the basis of which this document is produced, can be obtained at <http://www.enlace-project.eu/results.aspx#C9>



2. INTRODUCTION

The promotion of the “**EU-LAC Knowledge Area**” was first mentioned in the Guadalajara Declaration of 2004 for solving societal problems and creating new opportunities: *"We consider that the future EU-LAC Knowledge Area should be built on the results of the successful science and technology bi-regional dialogue and include reinforcement of cooperation in science and technology, higher education and information and communication technologies."*

It has been further addressed in the EU-LAC Summit in Madrid in 2010 that put **Innovation and technology for sustainable development and social inclusion** as central theme. In this context, a new “**Joint Initiative for Research and Innovation (JIRI)**” for the LAC region has been developed. **Five senior officials working groups** were established to mobilize stakeholders on priority areas of mutual interest. Calling on a wide range of experts from both regions with the support of several INCONETs, the four **thematic working groups** have narrowed down objectives for the short- and medium term and outlined concrete activities and funding options to be further elaborated for bi-regional cooperation in the following areas:

- Bioeconomy including food security – co-led by Argentina and France
- Information and Communication Technologies (ICT) for meeting societal challenges – co-led by Chile and Finland
- Biodiversity and Climate Change – co-led by Colombia and France
- Energy – co-led by Mexico and Spain

As part of the main activities of the WP2 of ENLACE, a priorities match-making exercise has been produced resulting from the various the dialogue workshops held during the project. The following document gives account of the main results that stemmed from these dialogue workshops organized for this purpose as listed below:

Information and Communication Technologies (ICT):

- Workshop in Antigua, Guatemala May 2012
- Workshop in Brussels, Belgium October 2012

Knowledge Based Bio-Economy (KBBE):

- Workshop in Dominican Republic, Santo Domingo, March 2011
- Workshop in Belgium, Brussels, October 2012

Biodiversity and Climate Change:

- Workshop in Panama City, Panama April 2013

The document intends to summarize the main outcomes as well as the process and methodologies used to obtain thematic matrixes that crossed the identified sub-themes with the main JIRI's identified areas. All these outcomes aim to further feed the S&T policy dialogue events and future S&T EU-Central America cooperation activities.



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The aim of the Dialogue Workshops organized by ENLACE (often in collaboration with other similar such as EUCARINET, focussing on Europe - Caribbean cooperation) was to strengthen the international visibility of Central American and Caribbean research potential in different fields identified by the JIRI group and to increase the collaboration possibilities with Europe. The objectives of these gatherings were:

- a) To identify specific research lines and scientific priorities of common interest and benefit to the three regions in each chosen theme;
- b) To discuss challenges and solutions for EU-Central America cooperation that can guide the work of the ENLACE project.

The workshops have been organised based on the following principles:

- **Supporting the Joint Initiative for Research and Innovation (JIRI).** With the launch of the JIRI following the 2010 Madrid summit, the political context of the ENLACE project has evolved consistently since project start. Increasing importance has been given to the contribution / support of ENLACE activities to this political dialogue, by providing Central American specific inputs, highlighting the strengths and comparative advantages of Central American countries in this overall “Latin American & Caribbean (LAC)” dialogue. As such, the proceedings of several expert dialogues have been distributed as input to different SOM meetings as the one held in November 2012 and April 2013. Consequently, both projects have come closer to the Working Groups with the aim to valorise the results so far achieved and help support the dialogue further in the new INOCNET for the entire CELAC region called ALCUENET.
- **Sharing resources: ENLACE - EUCARINET common events.** For efficiency concerns, these workshops were organised under the umbrella of the ENLACE and EUCARINET projects. However, for each, particular attention was paid to identify the specifics of each region.

An average of 12 experts, 6 from Central America and 6 from the Caribbean countries were chosen to represent both regions in each Dialogue. The process to search and select the experts was conducted by the General Secretariat of the Central American University Superior Council (SG-CSUCA) for Central America, while in the Caribbean was under the responsibility of the partners in EUCARINET consortium. Once the final list was agreed, the researchers were officially notified with a formal invitation. Later on, background documentation about the Dialogue Event was sent to them to prepare their participation in each event and guarantee a quality research exchange and dialogue.

After the dialogue events, the exercise to link the identified research lines to the priorities spotted by the EU-LAC Senior Official Meeting Working Group was done for each theme respectively and is represented on the cross-matrixes elaborated per theme. Since some themes overlap in several issues, these can be further explored and completed as in the case of the KBBE and Climate Change and Biodiversity themes. Furthermore, a list of stakeholders for each theme is provided as part of the exercise of consolidation of information and main results. Finally, a set of concluding remarks has been elaborated with the objective to provide a solid base for further cooperation projects between the EU-LAC region.



3. MATCH-MAKING PRIORITIES IN THE FIELD OF ICT

The ENLACE & EUCARINET projects dedicated two events to the ICT theme:

- Antigua, Guatemala May 2012
- Brussels, Belgium October 2012



The two events aimed to identify the knowledge gaps, relevant for FP7 themes, with potential for regional/global cooperation and of mutual (EU-CAC¹) interest for collaboration.

The Guatemala workshop covered four different ICT Thematic Areas identified as elements of mutual interest through prior exercises developed by ENLACE and EUCARINET. The selected sub-themes were as follows:

- **Technology-enhanced learning (e-learning)**
- **e-infrastructure (sustainable development and disaster management)**
- **Living Labs and ICT-based innovation models (including smart cities, transport and e-governments)**
- **ICT for health**

Common understandings of similar problems emerged, even if perspectives remained sometimes different. Research networks such as C@ribnet, RedCLARA and GEANT were highly encouraged among the participant experts as merging forces. Building up from existing initiatives such as these, will allow leveraging efforts and avoid overlapping and double efforts.

One major remark underlining ICT initiatives was their lack of continuity and sustainability, especially in areas such as disaster management. To counterbalance this, EU-born innovation methodologies such as the one of Living Labs can be helpful as drivers for improving social cohesion within CAC countries. Involving CAC policy makers in research cooperation is critical, as they can push for policies facilitation cooperation: to this end, key actors from the CAC region such as CARICOM, CKLN, and CSUCA must be kept involved in the discussion.

Further, the objective of the Follow-up on the ENLACE-EUCARINET Experts Dialogue ICT Workshop, organised on 18 October 2012 in Brussels, was to present to and further discuss with European stakeholders the results of the ICT Experts Dialogue Workshop that had been held in Antigua, Guatemala, on 28-29 May 2012, with the final aim of strengthening the international visibility of

¹ CAC: Central America and Caribbean



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Central American and Caribbean regions (CAC) and research potential in the field of ICT and to increase the collaboration possibilities with Europe.

The workshop was closed with some challenges and solutions identified during the Guatemala workshop. In general, some of the biggest advantages of the ICT field were as follows according to the results:

- small organizations or SMEs can compete with large companies
- ICT is a great way of facilitating the flow of knowledge among researchers
- ICT can help to quickly overcome emerging problems (etc. in disaster management)

The current situation of the field was considered quite reassuring since policy dialogue among stakeholders has never been so smooth and ICT is developing towards meeting some emerging societal needs, an area that should be further explored by the ICT Working Group. Nevertheless, more realistic engagement was required from the Central American and Caribbean region. The role of the National Contact Point in the regions also needs to be refined and strengthened, as capacity building should take place through their networks.

Concerning the ways of increasing participation in ICT from the Central American and Caribbean regions the following ideas were gathered and concluded:

- more pilot projects are needed to be launched
- the industrial sector and the academia should be brought together
- academic conferences should be organized in the regions
- PhD study programmes on ICT should be supported and supervised by professors
- information provided by respective communities should be gathered
- an Open Science repository should be built for the Central American and Caribbean regions

The below research lines were identified as priority domains for development of ICT in the Caribbean and Central America. They have been linked to the 3 priorities identified by the EU-LAC Senior Official Meeting Working Group on ICT.



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Research lines Vs. JIRI's WG identified areas

Living Labs			Priorities EU-LAC SOM Working Group on ICT		
Theme	Beneficiary (Caribbean, Central America,	Leading Country (ies)	Capacity Building	EU-LAC ICT Observatory	LAC Network of Technology Platforms
Living Lab Methodologies	both	European Countries	✘	✘	✘
Living Labs for social cohesion	both	Costa Rica	✘	✘	
Living Lab oriented Software development	both	Cuba	✘		✘
Living Labs and online trust	Caribbean and Central America	Costa Rica	✘		

e-health

Tele cardiology and Tele gynecology and obstetrics	Caribbean	Dominican Republic	✘		✘
Cancer personalised treatment through the development of algorithms for the selection of optimal treatments	Central America	Costa Rica	✘		
Hemodialysis vascular access patency in end-stage renal disease patients	Central America	Nicaragua	✘		
Decision Support Systems in Medicine	Central America	Panama	✘		✘
e-Learning in Health	Central America	Panama	✘	✘	
Use of ICT tools for the detection of problems and the monitoring of patients having sickle cell disease	Caribbean	French West Indies	✘		
Image analysis for the recognition of Caribbean plants	Caribbean	French West Indies	✘	✘	✘
Epidemiologic vigilance of international health standards and code	Central America	Guatemala	✘	✘	
Strategies to ensure coverage and access to e-health	Central America	Guatemala	✘	✘	✘



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Technology enhanced learning

M-learning - more feasible than computer supply & energy to power it up	CAC	Haiti		✘	✘
Elearning for quality training for teachers, de-centralized from the excellence center	Central America	Costa Rica	✘		✘
Regional open campuses for research as a solution to support teachers and researchers	Central America	CAC	✘	✘	✘
Re-use and implement others' developments rather than starting own tools	All (CAC + Europe)	All	✘		✘
e-Learning in Health	Europe	All	✘	✘	

e-infrastrucutre

The need for cooperation of CAC and EU on development and optimization of detection, warning and mitigation systems is essential	Caribbean and Central America	Guatemala, Haiti	✘		
Global concept of emergency shelters distributed across all regions coordinating all proactive and post-disaster actions.	Caribbean and Central America	Haiti		✘	
Knowledge transfer in the area of business continuity plans (BCP).	Caribbean	Antilles	✘	✘	
Use C@ribnet, RedCLARA and Geant research and education networks as primary vehicles for research activity, which may include: -Use of supercomputers, disaster simulations, etc -Use of networks for data sharing, videoconferencing for disaster recovery matters. Share of EU civil construction norms and regulations with the CAC region.	Caribbean and Central America	Jamaica	✘	✘	✘
Share of EU civil construction norms and regulations with the CAC region.	Caribbean and Central America	Guatemala	✘		



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Furthermore, a number of initiatives and ideas were put on the table to be developed in the *short term*. These were:

- ICT observatory for social inclusion (ICT hubs for social inclusion)
- LAC Network of Living Labs and LAC Network of ETPs
- LAC network for intelligent transport and smart cities.

However, in order to attain the latter, higher (and realistic) engagement from CAC countries is needed, both at the level of research projects and of research policy dialogue by strengthening the local support structures, and possibly to connect them. On this line, ICT was more than a research field as it can facilitate knowledge sharing. The CAC scheme seems to be working, under some conditions.

Some **aspects where need for improvement exist** were mentioned, such as the need to better and closely work with industry, the importance of documenting research at the CAC level, the low level of cooperation between the Central American and the Caribbean region. From an FP7 viewpoint, the main challenge resides on demonstrating the added value of research groups from the CAC region and their “competitive advantage” towards the EU counterparts.

In terms of activities, bringing academic conferences in the region (PROFRES, ITCSE, CATE, SEPGLA²...) as well as organizing CAC virtual or physical events for researchers is also highly encouraged in order to foster research visibility in the area. Also, participating in regional initiatives of cooperation other than FP7 such as the submission of projects to the “Connect the Americas” Summit held Panama in July can leverage the possibilities of obtaining funding not only sticking to EU programmes. In fact for the ongoing FP7 programmes it has been suggested to have a well-structured **measurement of the impact of FP7 fund on the CAC countries** since its beginning. This can also gather important criteria for future calls and objectives

Finally, the relevance to foster collaboration between industry and academia (IPR support, joint research projects, internships in industry) or by integrating local SMEs to the process of innovation was encouraged. Connecting “niche sectors” in the region to reach a research critical mass by collecting research ideas in open science repositories has also been stated as a solution. In terms of solution from the academic point of view some ideas were brought such as the support the creation of **regional PhD programmes on ICT**, engaging EU professors as tutors, fostering dual degrees, the use EU or LA professors to supervise PhDs in CAC, the collection of **information on the research communities in CAC**.

² <http://www.iasted.org/conferences/home-774.html> and <http://www.sepgla.com/>



✓ **ICT STAKEHOLDERS CONSULTED IN THE CAC AREA**

Below, there is a list of CAC actors concerned by the ICT theme who participated in the ICT workshops.

Caribbean experts				
Name	Surname	Organisation	Country	Theme
Darwin	Munoz	UNIBE- Universidad Iberoamericana	Dominican Republic	Caribbean e-health
Miguel Angel	Cid	CONCENTRA - private sector	Dominican Republic	Caribbean expert e-infrastructures
Philippe	HUNEL	UAG –Univeristé Antilles Guyane	Martinica	Caribbean Expert - eLearning
Sébastien	REGIS	French West Indies and Guyana (FWIG)	Guyane	e-health
Ludgardo	E. Job	UNA - PricewaterhoseCoopers	Curaçao	e-infrastructures
Vilma	Alet Casas	CARTRONIC - CIH (private sector)	Cuba	Caribbean Expert - innovation models - Living Labs
Julio	Martínez	Universidad Politécnica “José Antonio Echevarria”	Cuba	Caribbean Expert - innovation models - Living Labs
Jennifer	Britton	CARICOM	Guyana	ICT policy expert
Colleen	Wint-Smith	CKLN- Caribbean Knowledge Learning Network		E-infrastructure
Raymond	Noel	Université d'Etat	Haiti	Caribbean e-learning
Lynwood S.	Bell	The Technology Campus	Anguilla	Caribbean Expert - e-health



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EU experts

Fabio	Nascimbeni	MENON	Belgium	EU Expert - eLearning
Daniel	Burgos	STELLAR NoE	Spain	EU Expert - eLearning
Katalin	Gallyas	City of Amsterdam- Living Labs	Netherlands	EU expert- Living Labs & Innovation session
Esteve	Almirall	ESADE Business School and Council Member of ENoLL		EU expert- Living Labs & Innovation session
Roberta	Annichiarico	H. Santa Lucia		EU expert - Ehealth
Stavroula	MAGKLAVE RA	CERTH – Center for Technology Hellas	Greece	EU expert e-health
Georgios	Tsakis	Digicel	Greece	infrastructure & disaster management (Telecoms)
Albert	Comellas	CIMA Foundation,	Spain	infrastructure & disaster management

Central American Experts

Miguel	Vargas-Lombardo	Universidad de Panama	Panamá	eLearning, ehealth
Alvaro	De la Ossa Osegueda	Universidad de Costa Rica	Costa Rica	eLearning
Rocael	Hernández Rizzardini	Universidad Galileo	Guatemala	eLearning
Lochi	Yu	Universidad de Costa Rica	Costa Rica	Living Labs
Marco Antonio	Munguía Mena	Universidad Nacional de Ingeniería	Nicaragua	eHealth
Arturo	Camacho	Universidad de Costa Rica	Costa Rica	eHealth
Francisco Javier	Mata Chavarría	Universidad Nacional de Costa Rica	Costa Rica	TICs for Sustainable Development
Jorge	Amador Astúa	Universidad de Costa Rica	Costa Rica	eInfrastructure (Disaster Mitigation)
Patricia	Hernández Cañadas	Universidad Nacional Autónoma de Honduras	Honduras	TICs for Sustainable Development
Marcelo	Jenkins	Universidad de Costa Rica	Costa Rica	eInfrastructure
María del Milagro	González	Instituto Tecnológico de Costa Rica	Costa Rica	Living Labs
Jorge Armin	Mazariegos	Universidad de San Carlos	Guatemala	Innovation Models, e-government



4. MATCH-MAKING PRIORITIES IN THE FIELD OF KBBE

The ENLACE project dedicated two events to the Knowledge Based Bio-Economy (KBBE) theme held in:

- Dominican Republic, Santo Domingo, March 2011
- Belgium, Brussels, October 2012

I. Dominican Republic workshop

This workshop aimed to identify through a first approach research lines and knowledge gaps, relevant for FP7 themes, with potential for regional/global cooperation and of mutual (EU-CAC) interest for collaboration.

- ✓ **RESEARCH GAPS/research lines with high potential for EU-CAC collaboration**
- **Biotechnology for better/sustainable use of CAC biodiversity**
 - For better food
 - For energy purposes
 - To meet challenges related to climate change
- **Management of natural resources/biodiversity**
 - Biodiversity to optimize ecological services (holistic approach)
 - Biodiversity and food chain: food quality & safety; development of functional foods for improved nutrition, based on existing biodiversity resources; biotechnology applications for novel and/or improved food processing
- **Optimization of use of biomass for energy and industrial uses**
 - Biofuels from conventional and non conventional resources (e.g. novel biodiversity resources, agricultural and agro industrial waste – sugar cane)
- **Integrated water resources management**
 - In particular, problems due to scarcity of land <> water resources
- **Management of natural risks**

The consensus reached in the Dominican Republic Dialogue Workshop, set the basis for further discussing the topics that were identified and discussed as potential topics of mutual interest: 1) Research on biodiversity to “optimize ecological services”, 2) Use of microorganisms, for food and non-food use, 3) Food and food chain related issues, 4) Optimization of the use of biomass for energy and industrial uses.



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II. Brussels workshop

The Experts' Dialogue workshop organised in October 2012 allowed to share and validate the first findings of the foresight study with experts (Santo Domingo and Curaçao) and to further proceed to the establishment of roadmaps identifying and prioritizing the interventions points to make the Bio-economy a reality.



There were two main aspects that, once tackled, will contribute to the realization of a vision of Central America as an integrated region, clearly aware of their common goals, capabilities and resources. These are: the development of a broad regional communication infrastructure, both physical, (roads) and digital (Central American fiber optics backbone for data exchange), and new mechanisms to exchange knowledge, experiences, failures and aspiring goals. Central American region has "Centers of Excellence", groups of high level scientific and technological expertise with a longstanding

experience in collaborating through international networks, mainly in bilateral terms. This is why, it is time for CA countries to expand this bilateral accomplishments regionally.

The pathways below were identified as priority domains for development of a bio-economy in Central America during the ENLACE dialogue in Brussels, October 2012. They have been linked to the 3 priorities identified by the EU-LAC Senior Official Meeting Working Group on Bio-Economy. Some of these priority pathways are also relevant to the Climate Change and Biodiversity Working Group.



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EUCARINET-ENLACE Caribbean Bio-Economy Priority Pathways	Priorities EU-LAC SOM Working Group on Bio-Economy			
	Capacity Building	EU-LAC Bio-Economy Observatory	Biomass Conversion	Beneficiary (Caribbean, Central America)
FOOD VALUE CHAIN EFFICIENCIES				
Capacity building for all stakeholders of the food value chain	x			CAR
Information system on Caribbean fruit and vegetables		x		CAR
Adding value to wastes from local agri-food processing			x	CAR
Food Processing – effects & info about bioactives compounds	x	x		CA
ECO-INTENSIFICATION AND ECO-SERVICES				
Eco-tourism as a basis for sustainable development	x			Both
Agro-diversification Synergetic production (agro-ecology)	x			Both
Water and soil retention (water management & value)	x	x		Both
Climate change mitigation	x			CAR
Integrated pest, waste and nutrient management	x		x	CA
Organic farming and sustainable land management	x	x		CA



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EUCARINET-ENLACE Caribbean Bio-Economy Priority Pathways	Priorities EU-LAC SOM Working Group on Bio-Economy			
	Capacity Building	EU-LAC Bio-Economy Observatory	Biomass Conversion	Beneficiary (Caribbean, Central America)
No-till and conservation tillage agriculture		✘	✘	CA
Biodiversity conservation and sustainable management of ecosystems	✘	✘		CA
SUSTAINABLE MANAGEMENT OF MARINE BIODIVERSITY				
Integrated Coastal Zone Management and system approaches	✘	✘	✘	Both
Marine ecosystem degradation and its effects on human health		✘	✘	Both
Environmental profit and loss accounting / true pricing	✘	✘	✘	CAR
Integrated aquaculture		✘	✘	CAR
Scientific Data Collection	✘	✘		Both
Natural Resources governance and socioeconomic studies	✘	✘		Both

Some initial recommendations stemming from the dialogue were identified.

- ✓ **Trans disciplinary research:** Development of local solutions with those, who can/want to apply them, solutions that work, are of benefit for local communities and that are most convincing. Create knowledge by means of implementation of research projects according to family needs.
- ✓ **Scientific data collection:** Overcome constraints pertaining to policy and weak institutional support by facilitating investment for sustainable research infrastructures and data access. This would facilitate the opportunities to work with existing data and experiences to identify major socio-economic and anthropological issues.



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- ✓ **Community empowerment:** Develop competences and capacities in the rural family in the management of his or her farming systems, to promote ways of rural associative and organizational structure of the family that aims to articulate the agro feeding chain. Foster an entrepreneur culture in youngsters that permit generation of quality and sustainable employment, to establish educative modules of GAP that permit diffusion (TT) of knowledge amongst farmers and technician. Promote efficient productive systems that guarantee food sovereignty and security in the rural family.

- ✓ **Improving governance and sensibilisation:** Develop necessary changes in human/society behaviour in the face of the on-going loss of coastal and wild habitat and continue the re-structuration of these societies. Focus on particular needs for human resources to foster governance-related research in the region and needs to develop appropriate methodologies for social and economic valuation for sustainable bio-diversity management.

✓ **KBBE STAKEHOLDERS CONSULTED IN THE CAC AREA**

Name	Surname	Country/organisation	sub-theme
Shirley	Skerritt-Andrew	EASTERN CARIBBEAN STATES Embassy	Observer
Paula	Hippolyte-Bauwens	EASTERN CARIBBEAN STATES Embassy	Observer
Wendy	Goico	Dominican Republic Embassy	Observer
Sergio	VINOCOUR	COSTA RICA Embassy	Observer
Roberto	CÉSPEDES	COSTA RICA Embassy	Observer
Moisés	Merida	GUATEMALA Embassy	Observer
Joseph	ANTOINE	Haiti Embassy	Observer
Sieglinde	GRUBER	INCO Unit EC	Speaker
Valeriano	DIAZ	EEAS	Observer
Dietlind	JERING	EC, DG Research and Innovation	Speaker
Paul	VOSSSEN	EC, DG Research and Innovation	Speaker
Horst	PILGER	EC, DG DEVCO	Speaker



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EU Experts

Nadine	ZAKHIA-ROSES	CIRAD/ France	Food Value Chain Efficiencies
Gian Marco	LUNA	CNR-ISMAR/Italy	Marine biodiversity
Guy	HENRY	CIRAD/France	General
Eric	ARETS	WUR/Netherlands	Ecoservices
Manfred	SZERENCSITS	OEKO CLUSTER/Austria	Ecoservices
Cristino Alberto	GOMEZ LUCIANO	UNIBE – Dominican Republic	General
Davide	VIAGGI	University of Bologna/Italy	Food Chain/ Eco-intensification and Eco-service
Hans	HARTMANN	Université de la Rochelle/France	Marine Biodiversity
Frank	Heemskerck	RIMS – Research & Innovation Management Services, Belgium	Coastal marine biodiversity
Luc	FARGIER	Université de la Rochelle/France	Marine Biodiversity/Ecoservices

Caribbean Experts

ELSA M.	ACOSTA-PIANTINI	UASD- Dominican Republic	Food chain
ALEJANDRO BERNABE	MAÑON ROSSI	Dominican Republic	Eco-intensification and Eco-services
Judith	Gobin	St. Augustine, Trinidad	Marine biodiv- eco services
Benjamin	Mueller	NIOZ – UNA	Coastal marine biodiversity
François	Bussière	INRA- Guadeloupe	Eco-intensification and Eco-services
Odile	MARCELIN FRANCOIS-HAUGRIN	UAG – Guadeloupe	Food efficiencies
MARK J.A.	VERMEIJ	UNA-Curaçao	Coastal marine biodiversity
Claude Marc	Bouchon	UAG Guadeloupe	Coastal marine biodiversity
Alejandro	Bernabe Manon	Plan Yaque, Dominican Republic	Eco-intensification and Eco-services
Sean	Carrington	UWI- Barbados	Eco service



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Central American Experts			
Freddy Sebastián	Alemán Zeledón	Nicaragua, Universidad Agraria	Eco-intensification and ecosystem services
Luisa E.	Castillo	Costa Rica, Universidad Nacional	Eco-intensification and ecosystem services
Alfonso	Fuentes Soria	Guatemala, Consejo Superior Universitario Centroamericano (CSUCA)	Eco-intensification and ecosystem services
Moisés	Gómez	Nicaragua, Consejo Nicaragüense de Ciencia y Tecnología (CONICYT)	Eco-intensification and ecosystem services
Jorge	Mendoza	México, Colegio de la Frontera Sur (EcoSur)	Eco-intensification and ecosystem services
Miguel	Rojas-Chaves	Costa Rica, Instituto Tecnológico de Costa Rica	Eco-intensification and ecosystem services
Manfred	Szerencsits	Austria, Öko Cluster and University of Kassel	Eco-intensification and ecosystem services
Marianela	Cortés Muñoz	Food specialist, University of Costa Rica	food chain efficiencies
Gusman Catari	Yujra	Agricultural engineer, Honduras	food chain efficiencies
Eddi Alejandro	Vanegas Chacon	Environment, Guatemala	food chain efficiencies
Tarsilia Eldiney Silva	De Carranza	Food industry, Nicaragua	food chain efficiencies
Helena	Molina Ureña	Universidad de Costa Rica, UCR	sustainable management of marine biodiversity
Matilde	Sommariba Chang	Universidad Nacional Agraria, Nicaragua, UNA	sustainable management of marine biodiversity



5. MATCH-MAKING PRIORITIES IN THE FIELD OF BIODIVERSITY AND CLIMATE CHANGE

The ENLACE & EUCARINET projects dedicated one event to the Biodiversity and Climate Change theme:

- Panama City, Panama April 2013

The workshop covered different Thematic Areas identified as elements of mutual interest through priority setting exercises previously developed by ENLACE and EUCARINET and validated by the JIRI Working Group. These were:

- **Climate change and its relation with ecosystems (regional integrated approach including scenarios, modeling tools and assessment of climate extremes).**
- **Sustainable management of natural resources and natural hazards related problems.**
- **Scenarios of climate change. (Distribution and extinction risk of species)**



Common understandings of similar problems emerged such as data accessibility and management but also, a comprehensive and centred research on what could be next developed in cooperation with the EU with common socio economic benefits leading to tangible socio economic results. (I.e. avoiding isolated research that could hinder the high value of smaller, yet key areas of research). In addition, the discussion of a multidisciplinary bio diversity research can be encouraged as environmental issues have an Economical, Political, Ecological and Socio- economical effect that coordinated enough, could drive to societal agendas was commonly addressed. However, to this regard, a holistic view entails a difficulty with authorities since scientific and political agendas are difficult to coordinate. Cooperation at the CAC level again confirmed as fragmented due to lack of communication of actions and initiatives.

In terms of green industry creation, a number of initiatives and ideas were put on the table to be developed. These were:

- **Resource efficiency**, including energy efficiency should be prioritized in all policies: **it is a pre-requisite for decoupling** economic growth from natural resource consumption and environmental impacts.



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- **Changes in policy and regulatory instruments**, including research and innovation, need to be supported by **indicators and quantitative targets** with objective of **Absolute decoupling** for industrialized countries (factor 2 by 2030, factor 5 by 2050) and **Relative decoupling** for developing countries.
- **The JIRI should include Resource Efficiency and Green Industry** as areas of Joint Research and Innovation that will benefit the Climate, Biodiversity and Ecosystems. The knowledge created and practical innovations will benefit Governments, the Private Sector and society to pave the ground for increased EU-LAC cooperation.

Finally, in terms of potential lines of research identified, the exercise of crossing the workshop's findings against the five areas of common interest stemming from the survey addressed to EU-LAC STI-related institutions and ministries (July 2012) served to create the following matrix. The result is sought to give a clearer set of opportunities and research lines where the CAC region can be competitive and thus provide the JIRI working group key lines of research tackling Bio diversity and Climate Change.

Research lines Vs. JIRI's WG identified areas

CAC Bio-Diversity and Climate change Priority Lines of Research	Beneficiary (Caribbean, Central America)	Leading Country (ies)	Water-related problems (the way they could alter biodiversity and ecosystem processes)	Climate change and its relation with ecosystem functioning in a regional integrated approach	Bioprospecting, considering technology and knowledge transfer and benefit sharing	Focus on monitoring and impact of climate change on key species	Interdisciplinary research looking for multiple and interactive factors that lead to biodiversity loss and impacts on ecosystem functioning.
Climate change and its relation with ecosystems (regional integrated approach including scenarios, modeling tools and assessment of climate extremes)							
Changes in behavioral responses in key species. - In depth exploration of invasive species theme	Both		x	x		x	x
Research on tropical forests in CAC region - mountain ecosystems Research in indicators (butterflies)	Both	Mezoamerica region (Guatemala, Mexico)	x	x	x	x	x



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Water use practices in the communities - GIS data and Tools	Both	Dominican Republic	X	X	X	X	X
Sustainable management of natural resources and natural hazards related problems							
In depth research on fresh water and “Marine aspects” in both resources and policies - E.g., coral reefs, Impact on fisheries-	Both	Curaçao	X	X	X	X	X
Renewable energy	Both	Costa Rica		X			X
Volcanology and their impacts: relation with crops, water and plants (i.e. greenhouse emissions and toxicity).	Both	Dominica or Costa Rica		X		X	X
Research and scale issues and models: i.e. habitat characterization and species inventories for a base line	Central America	Panama		X	X	X	X
Scenarios of climate change (Distribution and extinction risk of species)							
Land use change – forest ecosystems protection & sustainable land and resource exploitation.	Both	Honduras	X	X			X
Changes in cloudiness resulting from increasing sea surface temperatures likely to affect eco systems - Genetic improvement of bio-prospection reproductive and frequencies of flowering of trees.	Both	Nicaragua	X	X	X	X	X
Indicators and data collection-transversal themes for research cooperation	Both	Costa Rica	X	X	X	X	X



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<p>Research – Bioprospecting in dry forest in CAC region: wild life and human communities living in water limited areas - microorganisms potential for finding innovative solutions and products E.g, pharmaceutical field.</p>	<p style="text-align: center;">Central America</p>	<p>Mezoamerica region (Guatemala , Honduras, Nicaragua, Mexico)</p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>
<p>Creation of a regional infrastructure to better monitor the direct impacts on tropical forest, and coastal and marine ecosystems</p>	<p style="text-align: center;">Both</p>	<p style="text-align: center;">Aruba</p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>



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✓ **BIODIVERSITY & CLIMATE CHANGE STAKEHOLDERS CONSULTED IN THE CAC AREA**

A list of actors concerned by the Biodiversity and Climate Change theme is listed below. It takes back institutions that participated to the theme workshop In Panama.

EU Experts			
Name	Surname	Country/organisation	sub-theme
EVAGELOS K.	KOSMIDIS	DRAXIS SA - Greece	Scenarios of climate change (Distribution and extinction risk of species)
Sergio	Calabrese	INGV - Italy	Sustainable management of natural resources and natural hazards related problems.
Jose M.	Baldasano	ETSEIB - Universitat Politècnica de Catalunya - Spain	Climate change and its relation with ecosystems
Caribbean Experts			
Phillipe	Hunel	Université Antilles Guyane - France	Climate change and its relation with ecosystems
Rahanna	Juman	Institute of Marine Affairs (IMA) Trinidad and Tobago	Climate change and its relation with ecosystems
Marcia	Henry	SRC - Jamaica	Climate change and its relation with ecosystems
Henri	Vallès	UWI- Barbados	Sustainable management of natural resources and mitigation measurements to natural hazards
Benjamin	Mueller	University NetherlandsRoyal Netherlands Institute for Sea Research Biological Oceanography Antilles-Curaçao	Sustainable management of natural resources and mitigation measurements to natural hazards
Carlos	Rodriguez	MESCYT - UNIBE - Dominican Republic	Scenarios of climate change (Distribution and extinction risk of species)
Gisbert R.	Boekhoudt	Aruba's Directorate of Nature and Environment- Aruba	Scenarios of climate change (Distribution and extinction risk of species)



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Central American Experts

Carlota	Monroy	Guatemala	Climate change and its relation with ecosystems
José	Fábrega	Centro de Investigaciones Hidráulicas e Hidrotécnicas, UTP- UP/ Panamá	Climate change and its relation with ecosystems
Raúl	Mora	Escuela Centroamericana de Geología. Red Sismológica Nacional UCR/ Costa Rica	Sustainable management of natural resources and mitigation measurements to natural hazards
Angie	Murillo	Coordinadora de Proyecto de Resiliencia Climática y Seguridad Alimentaria, UNAH - UNAH/ Honduras	Sustainable management of natural resources and mitigation measurements to natural hazards
Charles	Aker	UNAN-León/ Nicaragua	Scenarios of climate change. (Distribution and extinction risk of species)
Jorge	Cortés	UCR/ Costa Rica	Scenarios of climate change. (Distribution and extinction risk of species)

Other Stakeholders

Rafael	Reyna-Hurtado	ECOSUR -Mexico	Identifying knowledge gaps and research needs
Jorge	León	ECOSUR -Mexico	Identifying knowledge gaps and research needs
Christophe	Yvetot	United Nations Industrial Development Organization (UNIDO)	speaker

One important center to take into account for the regional reach in Bio diversity and climate change is the Climate Change Center in Belize (Information on Climate Change of the Caribbean, <http://www.caribbeanclimate.bz/>).



6. CONCLUDING REFLECTIONS

The workshops and further analysis exercises with researchers and stakeholders allowed fruitful knowledge exchange and the identification of common areas of interest of European and Central American research themes. Understandings of similar problems yet different perception of various concepts emerged throughout the whole exercise. This section intends to highlight these common gaps, needs and future views on the S&T dialogue experienced through the ENLACE project.

Data analysis

- **Facilitating access to information** - Sharing information, data collection and data strategy access is lacking in CAC region. Significant amount of hard socio-economic and environmental analyses plus multidisciplinary approaches are needed to better argue benefits to the *EU-LAC Knowledge Area* from the traditional research models
- **Redefining objectives and empowering communities** - Construction of S&T research lines is very locality specific and thus, taking account of local communities on the research processes is essential. Reviewing the economic structure by integrating aspects such as the socio economic impact and understanding the real complexity of the themes beyond the traditional factors has to be included
- **Research indicators.** – Pointing innovative products, evaluating infrastructure issues, creating focal points in the region that can take in the information, analyze and process them to finally make it available to policy and agencies, business and researchers for relevant use can be considered as a strategic approach.

Private Sector

- **Disconnection between research centres** and enterprises as **private sector** is largely national in most research themes. Gaps in the connection should be filled in order to pave common strategies both covering demands and offers.
- LAC region represents many opportune conditions for research development. Engaging the private sector & public agencies to join to formulate thematic research strategies and **connecting “niche sectors”** in the region is a must

Human Resources and Regional Capacities

- The **CAC area endeavours privileged position** with regards to terrestrial and marine **biodiversity**, as well as the availability for **bio-based strategies** and specific **geothermal and biomass energy** resource research. Spotting the regional research competitive advantages towards EU can be a starting point for future win-win collaboration.
- A **dedicated effort to understand the link between CAC and EU** but also the need to decouple the relation between urban constructions and preservation. E.g. sustainable energy related to the green economy and industry as an established link within the three regions.



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- **Capacity building and mobility of scientists** must be taken into consideration (training and advising PhD and Masters). One of the major remarks from CAC researchers has been their low participating rate, as universities typically focus on education for professionalization rather than pure research. Hence, there is a very low international visibility of researchers not only internationally but at the regional level. The need to construct data bases on these two regions has confirmed the key importance of both ENLACE and EUCARINET online data bases for an efficient cooperation among researchers and networks of researchers.
- **Tackling scientific Diaspora and brain drain** in both regions should be a substantial part of this capacity building strategy.

Sustainability measures

- **Exploring the added value of the CAC research.** In order to be sustainable, economic growth combined with the exploration of the research potential CAC countries can provide is necessary. Discovering different types of innovative products in the CAC region, evaluating infrastructure issues, creating focal points in the region that can take in the information, analyze it and process it to finally make it available to policy and agencies, business and researchers for relevant use is necessary.
- **Creating research networks** in the region able to share updated information. This can push forward specific research lines, thus building a significant pole of top research in the field available to the wider LAC region. The question whether it is time to construct open access through ICT becomes more relevant than ever.
- Thematic **research plans** are to be developed based on a **sustainable use, holistic, multidisciplinary and integrated approaches**

Strategies for ways forward

- Enhance **CAC-EU cooperation research** with a **long term vision** in order to collect substantial data for analysis. Including a wider audience to the research activities should be highly considered
- A **Thematic Observatory in the LAC** region may be a first step in informing and diffusing of appropriate information in different levels to research communities, policy makers and private stakeholders
- The Observatory can also help **create synergies** with past and current **cooperation projects** in order to continue building, evaluating and monitoring what has been done. Avoiding overlapping and double efforts is necessary to be cost-effective.
- Provision of **training programmes in countries of the CAC region** as well as the need to have local students and scientists trained at the same level should also needs to be taken into the equation.