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The Water, Energy and Food Nexus Dialogue in Latin America and the Caribbean



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1st Executive Committee Meeting

(29-30 March 2017, Bonn, Germany)

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The Nexus Regional Dialogue in LAC

- Implementing partner: **GIZ** in cooperation with the **UN-Economic Commission for Latin America and the Caribbean (ECLAC)**.
- Starting date of activities: 23/02/2016
- Actions built on activities that GIZ has been carrying out in the past years in LAC, with the aim to continue these activities and expand them.
- A grant agreement has been signed with ECLAC already in early 2015 “**Public Policies for Managing Water, Food and Energy Interactions in LAC**”. This agreement includes a list of activities that is now integrated into the NRD activities in LAC.



What is ECLAC and what does it do?

- **Economic Commission for Latin America and the Caribbean:**
 - One of the five **regional commissions** of the United Nations.
 - **Mission:** To promote economic and social development in the region:
 - **Emphasis:** On **public policy formulation**, not on investment projects (banks), nor technology (private), nor detailed policy design (national).
 - **Activities:** Research oriented at the formulation of public policies, technical advisory assistance, organization of meetings of experts, training courses.
- **Natural Resources and Infrastructure Division:**
 - Natural Resources and Energy Unit:
 - Management of natural resources (mineral, oil, gas and water) and provision of infrastructure (electricity, transport, water supply, sewerage).
- **Division of Production, Productivity and Management:**
 - Agricultural Development Unit:
 - Structural change, rural economies, rural poverty, rural youth and women, labor markets, bioeconomy, climate change, sustainable food systems.

Why our interest in the Nexus?

- Long ago, when we were not yet aware of the Nexus concept, we began to observe important interdependencies between water and energy, and frequently, with irrigated agriculture:
 - Introduction of modern technologies in irrigation can: 1) conserve water, but 2) increase energy demand and cause aquifer depletion.
 - Production of biofuels can 1) reduce dependence on oil/gas imports, but 2) negatively affect and make more expensive food production.
 - Energy subsidies in irrigation can: 1) increase agricultural production, but 2) cause groundwater drawdown and aggravate social inequalities.
 - Problems in one sector (droughts or earthquakes which affect electric supply) can cause damage in other sectors (water supply, irrigation).
 - Changes in energy prices have profound effects on: 1) the feasibility of projects that produce energy (hydroelectric plants), 2) conserve energy (energy efficiency), 3) water tariffs (utilities that rely on groundwater), and 4) opportunity cost of environmental uses.

The same applies to agricultural prices

Nexus in the region: Conditions

- **Abundant water resources** (almost a $\frac{1}{3}$ of the world run-off):
 - Economic development is based on the utilization of natural resources, particularly minerals, agriculture (including biofuels), forestry, fisheries and tourism, which use large quantities of water in their production:
 - The economies are export-oriented and highly dependent on international commodity prices.
 - Economic activities and population concentrate in dry/sub-humid areas.
- **Energy:**
 - Latin America and the Caribbean has the second largest hydropower technical potential of the world, and less than $\frac{1}{4}$ of this is developed:
 - Hydropower provides some 65% of all electricity generated (and even more in some countries); in comparison, the world average is just 16%.
 - Now the emphasis is not so on large plants, with multi-year regulation, but more on smaller single-purpose reservoirs, run-of-the-river plants, and modification of existing dams to increase their generation capacity.

Nexus in the region: Conditions

- **Agriculture:**

- The region accounts for 16% of global food and agriculture exports and 4% of food and agriculture imports:
 - Agriculture contributes 5% of GDP (from 3% in Chile to 20% in Paraguay).
- The region has significant unexploited water and land resources for agricultural development (production will increase by 80% by 2050):
 - Raising productivity will be essential; This includes irrigation development:
 - Agriculture accounts for 70% of water use, and together with forestry and land use change, is the source of 40% of greenhouse gas emissions.

- **Almost 80% of the population of the region lives in cities:**

- So, urban aspects of the Nexus are very important, particularly those related to water and sanitation services and wastewater treatment:
 - High nominal levels of access to water supply (97% of urban population) and sanitation (88%), but only 20-30% of wastewater receives treatment.



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Inception workshop

Regional study

Regional network

National case studies & Workshops (2)

Small-scale pilot projects (2)

Nexus policy guidelines

Regional HCD training module

Regional policy forum

Regional action plan

Extended network

giz



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CEPAL



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Inception workshop: *March 2016, Mexico*

Participants:

- Mexican authorities: National Water Commission (CONAGUA), National Energy Secretariat (SENER), National Commission for Efficient Energy Use (CONUEE).
- Bolivian authorities: Ministry for Environment and Water and the Ministry for Rural Development.
- Academia: Mexican Institute for Water Technology (IMTA) and Institute for Agricultural Engineering and Integral Use of Water.
- International: EU, IDB, UNECE and AECID.





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Inception workshop: *March 2016, Mexico*

- Discussion on the importance of the Nexus perspective for LAC at regional, national and sectoral levels.
- Identification of possible priority interactions: i) technical and economic aspects; ii) investment and capacity building, and iii) (inter) sectoral aspects.
- Link to the triangular cooperation between Bolivia-Mexico-Germany on wastewater treatment and reuse.





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Nexus regional network

- Conference of Iberoamerican Water Ministers (CODIA)
- Latin American Energy Organisation (OLADE)
- Inter-American Association of Sanitary and Environmental Engineering (AIDIS)
- Association of Regulators of Water and Sanitation of the Americas (ADERASA)
- Other Nexus implementers: IDB, WB, GCP, GWP (WACDEP) and academic institutions (Germany, UK, Chile and Peru)
- Spain: AECID and Min. of Agriculture, Food and the Environment
- Promoting of the Nexus approach and presentation of first results of the regional study at 8 events and/or workshops



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Expert meeting "Governance of WEF Nexus: Challenges of the 2030 Agenda in Water and Sanitation": Sept. 2016, Guatemala

- Participants: Water sector regulatory commissions.
- Organized by ECLAC, supported by AECID and the NRD.
- Conclusions on key issues for the Nexus implementation: I) new water legislation; ii) inter-institutional coordination systems; iii) information; iv) planning and project evaluation; v) public policies for demand management, supply security, efficient use of resources.
- Link to the bilateral project in Brazil "EE in the water supply sector".





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ECLAC Regional Dialogue on the Governance of the Extractive Industry and Infrastructure: *Nov. 2016, Chile*

- “Managing the WEF Nexus” session
- Some conclusions:
 - Identification of critical issues in the mineral extractive industry where the trade-offs and synergies are relevant.
 - Development of instruments to effectively implement the Nexus perspective (EIA).
 - Integrated models/methods to quantify the WEF flows in support to the formulation of public policies. Local typology of Nexus interrelations by river basin.





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Principal activities in 2017: GIZ

- National case study and workshop (*April-September 2017*)
 - Peru: Coordination of water policies with sectoral policies at national and sub-national level, taking as pilot the sub-basin of the Santa Eulalia river.
 - Coordination (ANA, ProAgua/GIZ, GWP: signature of LOI), TOR.
- Small-scale pilot project (*April-July 2017*)
 - Brazil: Cultivating good water (Itaipu) under the Nexus perspective.
 - Pre-evaluation (Feb 2017), coordination with Itaipu (Agreement), TOR.
- HCD training module (*Concept: May 2017, Development: 2nd Sem. 2017*)
 - Compilation of Nexus experts list in the LAC.
- Regional action plan (*to start: October 2017*)

Principal activities - ECLAC

- **Regional study** (identification of relevant Nexus issues in the region):

Done

– The water, energy and food Nexus in Latin America and the Caribbean: Planning, legal framework and identification of priority interconnections.

- **National case study** (high priority Nexus issues in a selected country):

2nd draft

– Nexus priority issues in Costa Rica and public policies for their better management, with emphasis on the Reventazón river basin.

- **National workshop** (Costa Rica):

Planned

– To check and complement the analysis in the national case study and transmit knowledge at the country level (May-June 2017).

- **Final project document**:

To start

– Public policy guidelines for better management of the Nexus interrelations.

- **Regional dialogue**:

Planned

– To discuss, complement and disseminate “Public policy guidelines for better management of the Nexus interrelations” (September-October 2017).

- **Web platform**:

Done

– <http://www.cepal.org/es/proyectos/nexo-agua-energia-agricultura-alimentacion>

Difficulties for the implementation

of the Nexus approach in the region

- **Lack** (or even absence) **of relevant information**:
 - Available information is extremely limited, fragmented, incomplete and unreliable. It is often based on estimates and not on observations.
- **Poor governance**:
 - Management, planning and monitoring systems are very weak, especially for water, agriculture and land-use. The region is highly informal and suffers from a failure to comply with formal norms.
- Insufficient knowledge of **Nexus dynamics at the local level**:
 - There has been little research on Nexus dynamics at the basin level.
- There are **large differences** among and within the countries:
 - It is impossible to propose a common “regional” Nexus typology, so one should distinguish, at the very least, **5 more homogeneous sub-regions**:
 - 1) Andean region; 2) Southern Cone; 3) Amazon region; 4) Central America and Mexico; and 5) Caribbean.

Nexus and water allocation

- As far as priorities in water allocation are concerned, there are three main types of water legislation in the region:
 - 1) which establish a list of priorities for water allocation; 2) which delegate this task to a specific authority (water authority, river basin agency); and 3) countries that yet do not have a water law:
 - Those in the first group, always assign the first priority to human supply, with agriculture in the second place and energy in the third (or below).
 - In practice, **hydroelectric power generation is usually in a privileged position in relation to other uses** (especially agriculture):
 - Capture, weakness or even absence of control mechanisms.
 - Differences in economic importance, negotiation power and influence.
 - Strategic location of facilities, usually in the upper part of the river basin.
 - Energy uses are usually more recent, concentrated in a small number of well organized users, so they always have well defined formal water rights.
 - Energy legal framework in some cases has a higher rank than a water law.

Priority Nexus interconnections

in Latin America and the Caribbean

- **Water-energy:**
 - Hydroelectricity is the main source of energy in the region:
 - Hydroelectricity is vulnerable to climate variability and climate change:
 - Excessive dependence on hydroelectricity generation can be a threat to water, energy and food security.
 - Competition between hydroelectricity generation and irrigation:
 - Multipurpose reservoirs: The need to balance competing demands.
 - Mining: Large water and energy needs and a source of pollution.
 - Conflicts over the development of hydroelectric and mining projects.
- **Water-food:**
 - The expansion of commercial agriculture is mainly export-oriented:
 - It coexists with small-scale family farming for domestic market.
 - Important issues include: Deforestation, monoculture, increasing nonpoint source pollution, sedimentation, erosion and flooding, displacement of local population and the decline of family farming.

Priority Nexus interconnections

in Latin America and the Caribbean

- Energy-water:

- The largest energy use in the region is for groundwater pumping, and water transport and use, particularly in irrigated agriculture:
 - Important issues include: Energy subsidies for irrigation pumping, and inefficiency of many irrigation systems and of pumping equipment.
 - Serious problem: Growing dependence on groundwater and increasing aquifer depletion, with negative effects on most disadvantaged groups.

- Water-energy-food:

- Irrigation modernization (95% of irrigated lands are surface irrigated):
 - More efficient irrigation is rapidly expanding: Increased production, but more energy and water use, which often leads to groundwater depletion.
- Biofuel production (Brazil, Argentina, Paraguay, Colombia, etc.):
 - Needs water and land, serves to produce energy and competes with food production for water and land, hence it can affect food supply and prices.
 - Opportunities for bioeconomy-type of solutions (biorefineries).

Priority Nexus interconnections

in Latin America and the Caribbean

Groups of nexus interconnections	R e l e v a n c e b y s u b - r e g i o n		
	High	Medium	Low
Agriculture and irrigation modernization	Andean and Central America	Amazon, Southern Cone and the Caribbean	
Biofuels	Amazon and Southern Cone	Andean, Central America and the Caribbean	
Hydroelectric power generation	Andean, Amazon, Southern Cone and Central America		The Caribbean
Oil and gas	Southern Cone, Amazon, Southern Cone and Mexico		Southern Cone, Central America and the Caribbean
Mining	Andean, Amazon, Southern Cone and Mexico	T h e C a r i b b e a n	
Urban nexus	A l l L a t i n A m e r i c a a n d t h e C a r i b b e a n		

Management of Nexus relations

- **Cross sectoral:**
 - Nexus approach is not an end in itself, but a means to ensure the respect of **human rights** (including the right to water) and to achieve the **Sustainable Development Goals** (SDGs).
 - Priorities:
 - To improve and strengthen the governance of all Nexus sectors, with emphasis on planning, coordination, control and information:
 - Criteria for decision-making, evaluation, thresholds, etc.
 - Nexus approach: Economic instruments (taxes, subsidies), state-financed projects, budgetary allocations and environmental impact assessment.
- **Agriculture:**
 - To reduce or condition irrigation subsidies. On-farm energy generation.
- **Water:**
 - To introduce Nexus considerations in water legislation.
 - Coordination between different regulatory agencies and authorities.

Issues for the future

- **Cross sectoral:**
 - Nexus in the context of the Sustainable Development Goals (SDGs).
 - Nexus typologies in an region characterized by high heterogeneity in agriculture and energy systems and in water resources availability.
- **Agriculture and rural development:**
 - Nexus in agriculture-food systems.
 - Nexus in the bioeconomy:
 - Production of renewable biological resources and their conversion into food, bio-based products and bioenergy via industrial biotechnology.
 - Nexus and the introduction of efficient irrigation technologies.
- **Water resources management and water services:**
 - Nexus and adaptation to climate change in water management.
 - Nexus and common agency problem in economic regulation.
 - Nexus and energy efficiency in drinking water supply and sanitation.

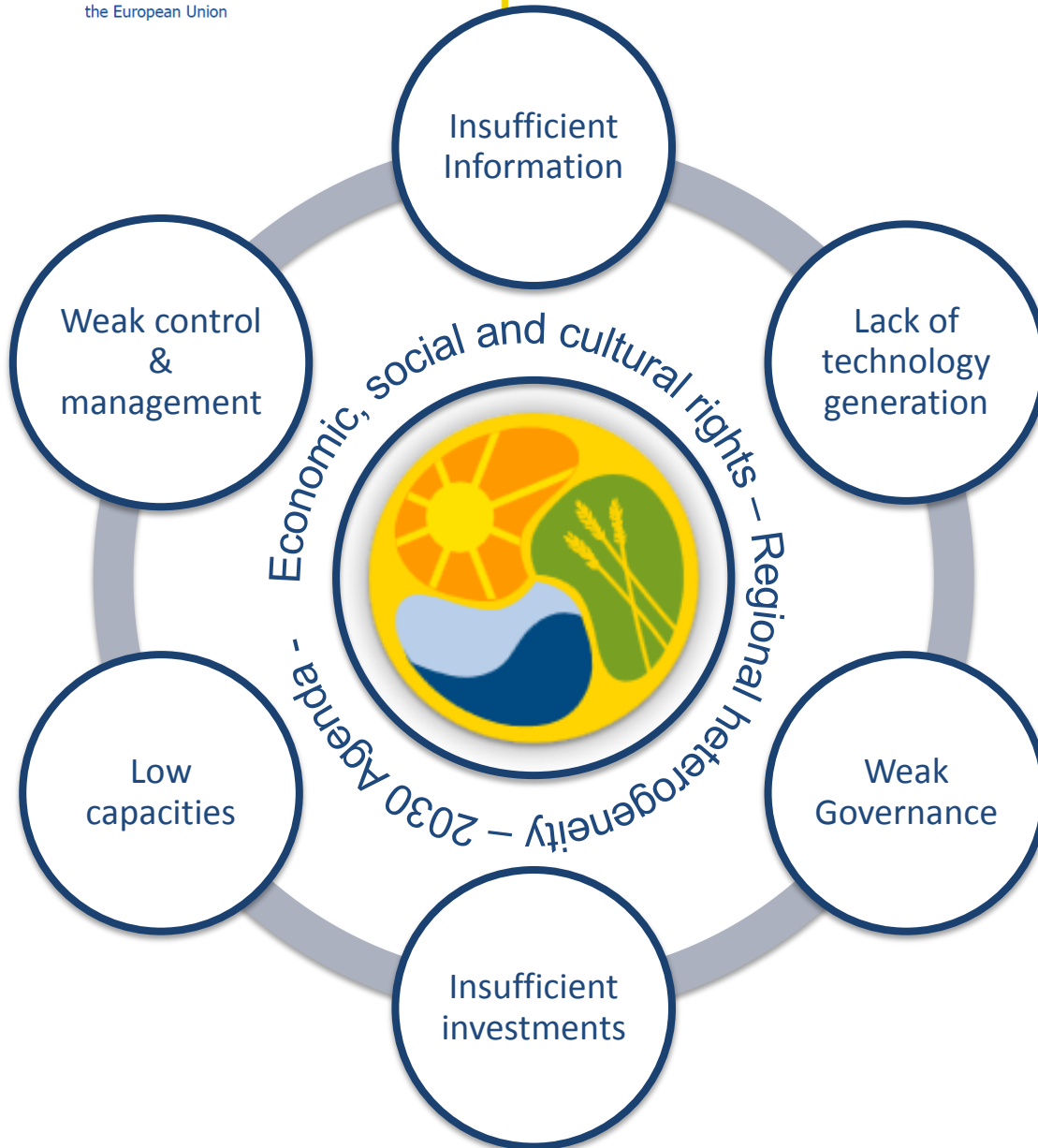


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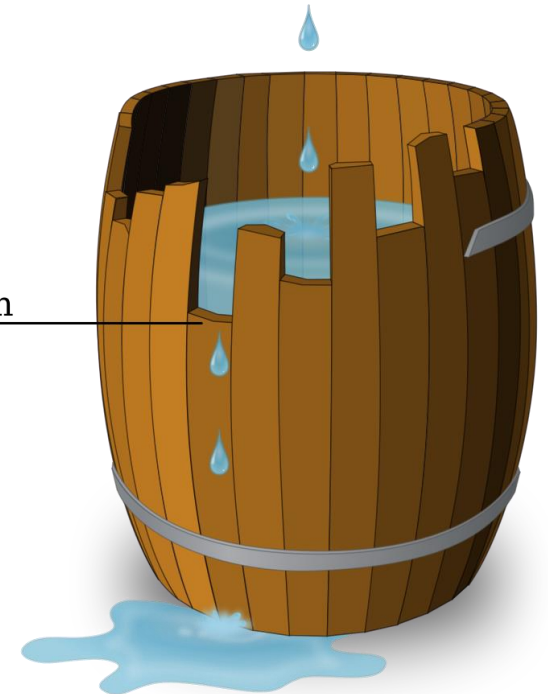
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These conditions limit the possibility of effective implementation

Minimum





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Thank you very much for your attention!



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