KLIMAPOLIS in the Brazilian Northeast

REVIEW OF THE KLIMAPOLIS WORKSHOP IN NATAL , RN

JUDITH HOELZEMANN – JUDITH.HOELZEMANN@CCET.UFRN.BR

UFRN – UNIVERSIDADE FEDERAL DO RIO GRANDE DO NORTE, NATAL/RN, BRAZIL

Objectives KLIMAPOLIS

"The objective is to co-design with city officials and assess win-win solutions that will lead to the development of smart cities, resilient to climate change and air pollution. "

"KLIMAPOLIS will operate in diverse urban environments across Brazil (São Paulo, Recife, Natal, and Fortaleza) "

Objectives KLIMAPOLIS 2nd phase

▶ Focus on urban areas in Brazilian Northeast (NEB):

    ▶ Proposal states, but is not restricted to: Fortaleza, Recife, Natal

Fortaleza Ceará:
4,000,000 inhabitants
7,440 km-2 area

Recife, Pernambuco:
3,700,000 inhabitants
3,200 km-2 area

Natal, RN:
1,600,000 inhabitants
1,700 km-2 área (city of
Natal only)

Facts about the Brazilian Southeast

- States: 4 (São Paulo, Rio de Janeiro, Espírito Santo and Minas Gerais)

- Area: 925,000 km-2

- Inhabitants: 88 M., 95 inhab./km-2

- Cities: 2 mega-cities (São Paulo and Rio de Janeiro), 4 more cities with more than 1 million inhabitants

Facts about the Brazilian Northeast

- States: 9 (Bahia, Sergipe, Alagoas, Pernambuco, Paraíba, Rio Grande do Norte, Ceará, Piauí, Maranhão)

- Area: 1,600,000 km-2

- Inhabitants: 57 M., 36 inhab./km-2

- Cities: 5 cities with more than 1 million inhabitants

Largest Urban Areas in the NEB

1° Fortaleza, Ceará: 193,4 km-2
2° Salvador, Bahia: 159,3 km-2
3° São Luís, Maranhão: 157,5 km-2
4° Recife Pernambuco: 121,6 km-2
5° Teresina, Piauí: 111,7 km-2
6° Natal, Rio Gr. do N.: 108,5 km-2
7° João Pessoa, Paraíba: 93,2 km-2
8° Maceió, Alagoas: 87,9 km-2
9° Feira de Santana, Bahia: 77,9 km-2
10° Aracaju, Sergipe: 48,1 km-2

Most Pop. Cities in the NEB (not Metrop. Areas)

1° Salvador, Bahia: 2.953.986
2° Fortaleza, Ceará: 2.627.482
3° Recife, Pernambuco: 1.633.697
4° São Luís, Maranhão: 1.091.868
5° Maceió, Alagoas: 1.029.129
6° Natal, Rio Gr. do N.885.180
7° Teresina, Piauí: 850.198
8° João Pessoa, Paraíba: 811.598
9° Jab. d. Guararap., Pernambuco: 695.956
10° Aracaju, Sergipe: 650.106

Klimapolis NEB meeting in Natal, RN

- March 18, 2019
- Participants:
  - UFRN – Federal University of Rio Grande do Norte
    - DCAC – Department of Atmospheric and Climate Sciences
    - Departament of Civil Engeneering
    - Department of Architecture and Urban Planning
    - Departament of Public Right
    - Departament of Public Policy

Klimapolis NEB meeting in Natal, RN

- ▶ Further Participants:
  - ▶ IFRN – Federal Institute of Rio Grande do Norte
  - ▶ INPE-CRN – National Institute for Space Research
  - ▶ IDEMA – Institute of Sustainable Development and Environment, RN
  - ▶ SEMPLA - Secreteriat for Planning – City of Natal, RN
  - ▶ SEMURB - Secreteriat for Urban Planning and Environment – City of Natal, RN
  - ▶ SESAP /VIGIPeq - State Secreteriat of Public Health, RN
  - ▶ SUDEMA - Administrative Supervision of the Environment of the state of Paraíba
  - ▶ UFBA – Federal University of Bahia, Departament of Analytic Chemistry, Salvador da Bahia/BA

Klimapolis NEB meeting in Natal, RN

- Main topics discussed:
  - Climate Modeling, Extreme Events and Vulnerabilities of NEB
  - Impacts of climate change on coastal areas of the NEB
  - Environmental Studies in Bahia (Ar Quality, Socio-economical atlas of Bahia)
  - Climate change impact studies in the state of Paraíba
  - Adaption of the city of Natal to climate change impacts
  - Public and urban policies in Natal associated to climate change impacts

Klimapolis NEB meeting in Natal, RN

Klimapolis reaching out for cities in the Northeast of Brazil

03/28/2019

Klimapolis is already ramping up preparations for its second
phase, which will include metropolitan areas in the Northeast
of Brazil. In order to involve new partners and understand some environmental issues in the region, a workshop
was organised by Judith Hoelzemann (Klimapolis member) at the Federal University of Rio Grande do Norte
(UFRN) on the 18th March. What was initially to be a small meeting became a much larger event with around 30
participants from universities, research institutes, and municipal and state government representatives. The very
strong interest in the project shows that partners in the region are willing to support and work with other
Klimapolis partners to seek solutions for some climate change and environmental impacts in metropolitan areas
in the region. Discussions covered topics from measuring and modelling air pollution in Natal and Bahia to
coastal erosion possibly due to to sea level rise. There was also good discussion with government
representatives where they informed about their responsibilities and issues they face related to impacts like
extreme events. It was also important to understand about climate vulnerabilities in the region and development

of public policy to mitigate those vulnerabilities and risks.

Klimapolis NEB meeting in Natal, RN

▶ Main outcomes

    ▶ Building up a Klimapolis Community in the NEB

    ▶ Collaboration agreements UFRN – IDEMA

    ▶ Perspectives of contacts to stakeholders in other states of the NEB: Ceará, Pernambuco, Paraíba.

    ▶ Perspectives of a bigger Workshop in 2020 in the NEB?

Objectives KLIMAPOLIS 2nd phase

"The objective is to co-design with city officials and assess win-win solutions that will lead to the development of smart cities, resilient to climate change and air pollution. "

- Extreme events (floodings, droughts)
- Coastal erosion
- Desertification processes affecting urban areas in Northeast Brazil
- Air quality assessment by monitoring and modeling studies

Future plans for the Northeast

- KLIMAPOLIS NEB Workshop in 2020

- Consolidate german-brazilian and brazilian-brazilian south-north and in-between NEB-states collaborations to tackle main aspects of region

- Further discuss during end of this session how Klimapolis partners can engage in NEB activities during the 2nd phase of Project.

3rd Klimapolis workshop participants from NEB:

- Tania Tavares, UFBA (remote talk)
- Arivaldo Amorim, UFBA
- Venerando Amaro, UFRN
- Cristiano Prestrelo, UFRN
- Jean Tavares, IFRN
- Paulete Martins, INPE-CRN
- Judith Hoelzemann, UFRN

3rd KLIMAPOLIS WS – Northeast Brazil session

Session 3: Preparing Klimapolis 2nd Phase in the Northeast of Brazil *(Chair: Judith Hoelzemann)*

▶ 14:00 – Review Klimapolis workshop in Natal *(Judith Hoelzemann, UFRN)*

▶ 14:15 - Hydrological modelling for flooding prevention in Natal, RN *(Venerando Eustáquio Amaro, UFRN/IDEMA)*

▶ 14:50 – Hydrological modelling of basins in the Brazilian Northeast *(Jean Tavares, IFRN)*

▶ **15:30 – Coffee break**

▶ 16:00 – Mitigation strategies in the Northeast *(Paulete Martins, INPE-CRN)*

▶ 16:15 – The Socioeconomic Atlas of the state of Bahia *(Tania Tavares, UFBA)* **(remote presentation)**

▶ 16:30 – Discussion of Klimapolis activities for the Northeast of Brazil

▶ **17:30 – End of day**

Most Populated Cities in the NEB (not Metropolitan Areas...)

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Preparing for the Northeast

- Other cities

Bandeira	Estado	Abreviação	Capital	Área	População(est. 2018)	Densidade(2010)	
	Alagoas	AL	Maceió	27.848,140	3.322.820[1]	112,33[1]	
	Bahia	BA	Salvador	564.733,177	14.812.617[2]	24,82[2]	
	ceara	CE	Fortaleza	148.920,472	9.075.649[3]	56,76[3]	
	maranhão	MA	São Luís	331.937,450	7.035.055[4]	19,81[4]	
	Paraíba	PB	João Pessoa	56.469,778	3.996.496[5]	66,70[5]	
	Pernambuco	PE	Recife	98.148,323	9.496.294[6]	89,62[6]	
	Piauí	PI	Teresina	251.577,738	3.264.531[7]	12,40[7]	
	Rio Grande do Norte	RN	Natal	52.811,047	3.479.010[8]	59,99[8]	
	Sergipe	SE	Aracaju	21.915,081	2.278.308[9]	94,36[9]	

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  - KLIMAPOLIS NEB Workshop in 2020
  - Consolidate german-brazilian and brazilian south-north collaborations to tackle main NEB aspects
  - Further discuss during end of this sessions