Webinar: Water and Climate Change: main impacts in the Southeast region of Brazil and possible ways to address this challenge

Global Climate Change Background

Slide: **What's the problem?**

- In many parts of the world, climate change threatens the availability of sufficient freshwater resources, and will lead to an increase in extreme weather events. Adapting to the effects of climate change on water systems is a crucial element of corporate water security.
- Obvious examples include switching to hydropower, or increasing the use of biomass or biofuels. But even low-carbon activities that are not water-intensive, such as the use of solar photovoltaics, require some water availability (in this case to keep panels clean and working at peak efficiency).
- Released at the World Water Week in Stockholm, the CDP new infographic report (Who's tackling urban water challenges?), shows how cities and companies are collaborating in response to climate change and urban population growth. The infographic report highlights:
    - 63% of cities disclosing in 2017 foresee a risk to their water supply from climate change;
    - The top three water risks are water stress and scarcity, declining water quality and flooding;
    - 62% of disclosing cities are now working with companies to address water and climate change, recognizing cross-sector collaboration as essential;
    - 80 cities are seeking US$9.5 billion of investment for 89 water management projects.
- The UN's vision is to achieve a secure and sustainable water supply by 2030 but to achieve this goal requires a change in the current way of managing natural resources.
- This infographic report produced by CDP, shows the first and most comprehensive dataset of global water action by cities and companies produced to date. Using information gathered from 569 cities and 1,432 companies, each reporting their water management activity, it illustrates how global cities and

companies are responding to the escalating challenge of climate change and urban population growth.

Source: CDP infographic report: **‘**Who's tackling urban water challenges?', case studies and full data at: www.cdp.net/cities.

Slide: Water Security

- Climate change is projected to significantly reduce renewable freshwater resources in most dry subtropical regions (Jiménez Cisneros et al., 2014).
- There is a great uncertainty about the availability of water resources due to water scarcity, causing negative impacts in places where industries and populations are highly dependent on a large amount of water resources for water supply or use in industrial processes.
- These changes often compound existing water risks. For example, in many areas, climate change will concentrate annual precipitation into a shorter time frame, thereby putting stress on local infrastructure and storage capacity in the dry months. Catastrophic weather events can also exacerbate existing water problems, such as a hurricane spreading pollution or a drought exacerbating water scarcity.
- Water resources present unique challenges in measuring and disseminating data at local and global scales, since water is a local or regional problem. Thus, challenges and opportunities depend on local rainfall patterns, river basins, and aquifers, as well as the degree and intensity of local use.
- The geographic scale and location of water use is crucial. A cubic meter of water withdrawn in the Amazon has very different consequences of a cubic meter used in the Atacama Desert. This creates complexities for companies that seek to understand and disclose corporate water use indicators as well as manage their use of water resources.
- Increasingly intense and frequent extreme climatic events are directly related to the availability of water. Water scarcity or poor quality of available water resources, directly and indirectly impacts companies, increasing their operational costs and forcing them to implement management strategies that are increasingly technology-dependent.

Sources:

- http://cdpla.net/relatorio/?page=25
- https://ceowatermandate.org/why-stewardship/worlds-water-challenges/

Slide: Sustainable Development Goals (SDGs)

- SDG 6 → Ensure availability and sustainable management of water and sanitation for all.
- SDG 13 → Take urgent action to combat climate change and its impacts.
- Water is an enabler, indeed a requirement, for achieving all the core SDGs.
- Water availability is a key ingredient for agricultural and broader economic growth.
- A major impact of climate change is on the hydrological cycle and therefore on the availability of water.
- Water is the primary medium through which climate change impacts will be felt by humans, society and the environment.
- 95% of all hazards associated with climate change are water-related (e.g. floods, droughts, heavy storms, changes in rain pattern and increase of sea level).
- A major adaptation strategy to improve resilience to the impacts of climate change, for example on agriculture, is through enhancing water security.
- Low carbon renewable energy such as wind and solar technologies will reduce demand for water and contribute to ameliorating climate change.
- Promoting good water governance, integrated water resources management and urban water resilience are important enablers for water to be integrated into a successful, solutions-oriented climate policy.

Sources:

- http://www.iwa-network.org/water-a-connector-to-transform-climate-policy-and-action/
- http://www.fao.org/land-water/overview/global-framework/sdgs-paris/en/
- http://www.un.org/esa/desa/papers/2015/wp141_2015.pdf
- https://sustainabledevelopment.un.org/sdg13
- https://sdgcompass.org/sdgs/sdg-13/

Slide: Blueprint for SDG Leadership

- The Blueprint for SDG Leadership aims to inspire all companies – regardless of size, sector or location – to take leadership actions in support of achieving the Global Goals.
- The platform illustrates how five leadership qualities (intentional; ambitious; consistent; collaborative; and accountable) can be applied to business strategies, models, products, supply chains, partnerships, and operations to scale impact.
- Blueprint is a framework for companies to develop and implement an SDG strategy and evaluate whether the company's action sets it on a course towards SDG leadership and achievement.

Targets of SDG13:

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.

13.2 Integrate climate change measures into national policies, strategies and planning.

13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

Respective actions proposed for companies by this platform, to achieve the goals of SDG 13:

1 → Ensure climate resilience of company and supply chain operations, and the communities surrounding them: Climate change is already affecting the most vulnerable countries and populations, which implies that leading action to increase resilience of and around supply chain operations in least developed countries and the small island developing States is particularly vital. Action might include setting supplier standards; and providing capacity building, technical, and financial support to relevant stakeholders, including through engagement with Governments and local partners to support context specific resilience and/or adaptation plans.

2 → Substantially reduce emissions associated with own and supply chain operations, in alignment with climate science.

3 → Shift to a portfolio of goods and services that have, and promote, negligible emissions from use: Development and deployment of novel technologies, business models, and solutions that radically reduce or promote the reduction of emissions from use. These should be designed in a way that can fully replace carbon intensive alternatives in existing portfolios.

4 → Promote climate conscious behavior and build capacity for climate action: As Governments are vitally important for climate action in their role as designers and implementers of ambitious climate policy, all companies should publicly support their actions and practice responsible public policy engagement. Leading companies actively promote climate conscious behaviour through building climate change awareness and education programmes. To this end, they can implement a climate change-specific communications, education and awareness raising strategy targeting behavioral change in the workplace, marketplace, and community.

Sources:

- https://www.unglobalcompact.org/take-action/action/sdg-blueprint
- https://www.unglobalcompact.org/docs/publications/Blueprint-for-Business-Leadership-on-the-SDGs-Goal13.pdf

Slide: Paris climate agreement

- To address climate change, countries adopted the Paris Agreement at the COP21 in Paris on 12 December 2015. The Agreement entered into force less than a year later. In the agreement, all countries agreed to work to limit global temperature rise to well below 2 degrees Celsius, and given the grave risks, to strive for 1.5 degrees Celsius.
- Implementation of the Paris Agreement is essential for the achievement of the Sustainable Development Goals, and provides a roadmap for climate actions that will reduce emissions and build climate resilience.

What are the key elements of the Paris climate agreement?

- Keep global temperatures below" 2.0°C (3.6F), endeavor to limit to 1.5°C:

The Paris Agreement sets landmark goals for taking action on climate change, aiming to keep temperature rise to well below 2.0°C (3.6 degrees F) and to pursue efforts to keep it to limit temperature increase to 1.5°C (2.7 degrees F). The goal is a drastic reduction in greenhouse gas (GHG) emissions, with measures such as energy savings, increased investments in renewable energy and reforestation.

- Limit the GHG emissions by human activity to natural carrying capacity:

So-called greenhouse gases have always been present in the atmosphere. The problem, according to the scientific consensus, is that human activities have contributed to breaking the balance. That is, there was an increase in the emission of these gases, mainly the carbon dioxide (CO_2). Industry, transport and land use have increased the concentration of these gases in the atmosphere.

These gases accumulate in the atmosphere and prevent the infrared radiation emitted by the planet from warming out into space. This causes the planet's temperature to rise, causing global warming.

- 5-year review of NDC:

One of the key objectives of the agreement is the establishment of a mechanism for reviewing countries' voluntary commitments every five years.

By 2020, countries have agreed to come back and either submit new or updated national climate plans (known as “nationally determined contributions”). Every five years after

that, countries will submit new contributions. Countries have also agreed that their mitigation plans will represent a progression beyond their previous efforts.

- Climate finance:

In 2009, developed countries pledged $100 billion a year from 2020 to help developing countries finance the transition to clean energy, as well as their adaptation to the effects of global warming, of which they are the first victims.

The aim is to help countries affected by the effects of global warming when adaptation mechanisms – such as weather warning systems or dykes – can no longer stop the irreversible damage caused by glacial melting, for example.

Sources:

http://www.wri.org/blog/2015/12/paris-agreement-turning-point-climate-solution

http://www.dw.com/pt-br/principais-pontos-do-acordo-de-paris-sobre-o-clima/a-18915243

Slide: The challenge of climate change

- The challenge of climate change and how to address it is now firmly on the global agenda. The Paris Agreement has been ratified at unprecedented speed by the international community, including some of the world's biggest carbon emitters, such as the US, China, India, the EU and Brazil.
- This historic agreement, with defined goals to limit climate change and clear pathways for achieving its goals, marks a step-change in the transition to a low carbon world.
- In the Paris Agreement, emissions reductions are talked about at the country level, and national governments will lead with policy changes and regulation. But companies can move much faster than governments, and they have an opportunity to demonstrate their leadership, agility and creativity in curbing their own substantial emissions. Many companies had already realized the need for action before Paris, and they played an important role in making that summit a success. Others, however, are yet to come on board.

Sources:

- https://wri.org/blog/2014/11/6-graphs-explain-world's-top-10-emitters
- http://wricidades.org/noticia/quais-são-nações-mais-poluentes-do-mundo
- https://noticias.uol.com.br/ciencia/infograficos/2015/12/06/dez-paises-emitem-quase-70-dos-gases-do-efeito-estufa-do-mundo.htm

Slide: The Brazilian NDC

- Countries across the globe adopted an historic international climate agreement at the U.N. Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP21) in Paris in December 2015. In anticipation of this moment, countries publicly outlined what post-2020 climate actions they intended to take under the new international agreement, known as their Intended Nationally Determined Contributions (INDCs). The climate actions communicated in these INDCs largely determine whether the world achieves the long-term goals of the Paris Agreement: to hold the increase in global average temperature to well below 2°C, to pursue efforts to limit the increase to 1.5°C, and to achieve net zero emissions in the second half of this century.
- The Paris Agreement, established in 2015 was a great achievement against the climate change effects. It united the world around one target: to hold the increase of global average temperature to 2°C.
- Each committed nation has established its own targets the so called NDCs, or Nationally Determined Contributions.
- The Brazilian NDC predicts a reduction of 37% on the emissions of greenhouse gases until 2025 and of 43% until 2030.

To achieve that there are targets in several areas:

- To reach zero illegal deforestation and restore 12 million hectares of forests;
- In agriculture, to restore 15 million hectares of degraded pastures;
- To elevate the participation of bioenergy to 18% and renewable to 33% of the energy matrix;
- To improve the infrastructure of roads and bring more innovation to the modes of urban public transport;
- To increase energy efficiency and to use clean technology in industry.

Sources:

- http://www.oeco.org.br/dicionario-ambiental/o-que-sao-as-indcs/
- http://www.wri.org/indc-definition
- https://www.youtube.com/watch?time_continue=93&v=OMvHAUtp_Bc

Slide: The National Adaptation Plan (NAP)

- The National Adaptation Plan (NAP) was instituted on May 10, 2016 through the Ordinance No. 150.
- It is an instrument developed by the federal government in collaboration with civil society, the private sector and state governments that aims to promote the reduction of national vulnerability to climate change and to manage risk associated with this phenomenon.
- In the preparation of the NAP, 11 sectors were considered, represented by the competent government agencies. The sectors covered were: Agriculture, Water Resources, Food and Nutritional Security, Biodiversity and Ecosystems, Cities, Disaster Risk Management, Industry and Mining, Infrastructure, Vulnerable Populations, Health and Coastal Zones.
- The differential of the NAP is that it establishes goals with a four-year term of execution. These goals are part of the contributions (NDCs) that Brazil has sent to the United Nations, within global efforts to combat climate change.
- The NAP will have four-year implementation cycles with its respective revisions, and will have a monitoring and evaluation system to support its management mechanisms.
- The plan sets general and sectoral goals to encourage sectors to develop actions that reduce vulnerabilities more quickly, as well as seize opportunities that climate change must provide.
- An example of this is the goal established by the Ministry of Health, which has committed to expand to 85% the percentage of Brazilian municipalities served by the National Water Quality Program for human consumption (Vigiagua) until 2019.

Sources:

- http://www.mma.gov.br/clima/adaptacao/plano-nacional-de-adaptacao
- http://www.mma.gov.br/images/arquivo/80182/BOOK_PNA_Executive%20Summary%20v4.pdf

Slide: PNA – Adaptation Strategy Water Resources

- Objective: The adaptation strategy for Water Resources aims to analyze the impacts of climate change on water resources and their main users, identifying adaptation measures to improve the response capacity of water resources management and governance in a scenario of greater climate variability.
- Implementation of this National Adaptation Plan (NAP) should take into account guidelines provided by the National Water Resources Policy (Law 9433/1997), the National Water Resources Plan (PNRH) and other related policy coordination instruments.

Sectoral and Thematic Strategy: Water Resources

Goal 3.9 → Incorporate measures for adaptation to climate change into actions carried out by the National Water Agency.

Initiatives → Identify/propose **"no regrets" adaptation measures**, targeted at enhancing capacity to respond of the National Water Resources Management System and at reducing vulnerabilities of the main water-user sectors, populations and ecosystems to foreseen adverse effects.

Uncertainties with respect to measurement of the impacts of future climate on the water balance, scarcity of financial resources and implementation gaps in water-resources management indicate a need to adopt no-regrets adaptation measures.

N**o regrets" adaptation measures** are targeted at problems linked to current climate variability, and hence strengthening resilience to future climate change. i.e., addressing current problems in a more robust manner and thereby increasing the capacity of society, of ecosystems, and of the economy to cope with expected changes.

The main interfaces between water resources and climate change relate to adoption of adaptation measures, targeted at increasing capacity to respond and reducing the vulnerabilities of populations and ecosystems to expected adverse climate-change effects. This should be the focus of an adaptation plan for the water resources sector to complement and reinforce significant Brazilian and international efforts to reduce greenhouse-gas emissions.

Responsible → ANA.

Indicator/Monitoring → Progress in deployment of water resources management projects and instruments.

The main objectives of the National Water Resources Policy (Law 9433/1997) are to ensure availability of water resources for integrated and rational use by current and future generations for purposes of sustainable development, and to promote prevention and defense against natural and anthropogenic critical hydrological events. The Law provides the following instruments for achievement of these objectives:

- Water Resources Plans, developed for multiple spatial and temporal scales;
- Classification of water bodies into classes, according to prevalent categories of use;
- Grating of water right;
- Water use charges; and
- The National Water Resources Information System (SNIRH).

Impact → Enhanced the capacity of ANA and of other component bodies of the National Water Resources Management System (SINGREH) to respond to challenges posed by climate change.

The main challenge, in the context of expected climate change, is to ensure effective deployment of management instruments that can be adapted to varying conditions, i.e., providing managers and decision-makers with adequate and flexible means of responding to a dynamic system, with a view to improving resilience of the water-resources management system and to addressing the long-term prospects of climate change.

Goal 3.10 → Develop integrated climatic and hydrological models and assess their impact on water resources management.

Initiatives:

- Use of new modelling techniques with dynamic and statistical methods borrowed from other Global Climatic Model (GCM) families, thereby increasing the number of projections available for analysis of the impact of climate change on water resources.
- Develop studies using Economics of Climate Adaptation (ECA) methodology, based on the Piracicaba-Capivari-Jundiai River Basin project.
- Support development scientific and technological researches, by means of a specific call for proposals to be drafted jointly with CNPq, targeted at the climate-change/ water-resources interface.

Responsible → ANA.

Indicator/Monitoring → Progress in the development of projects.

Impact → Enhanced capacity of component bodies of SINGREH to respond to challenges posed by climate change.

Sources:

- http://www.mma.gov.br/images/arquivo/80182/PNA_Volume%20I_EN.pdf
- http://www.mma.gov.br/images/arquivo/80182/Strategy%20for%20Water%20Resources.pdf

Slide: **CDP's Report 2016 –** Latin America

- More than 100 companies in Latin America participated in the report to Carbon Disclosure Program (CDP) during the year 2016, in the programs Climate Change, Water and Forest.
- The data were disclosed in the report entitled "Capital natural: transparência e gestão como estratégias de mitigação de riscos".

CDP → organization that provides the most complete environmental disclosure system in the world, for companies and cities.

- The report presents the actions that companies have developed towards an economic system that operates within a sustainable basis. The Paris agreement approved in record time and the SDG – UN Sustainable Development Goals are signs of a new reality.

Some highlights of the report:

- 115 companies from Latin America responded to CDP.
- Being mostly in Brazil: 62% of these companies are Brazilian, followed by 27% of Mexico and 13% of Colombia.
- Most companies are in the energy (19%), financial (18%), industry (16%) and consumer goods (14%) sectors.
- The main response strategies for water-related impacts are: investment in infrastructure, new technologies and best practices and awareness-raising.
- The greatest impact on water is physical and mainly suffered by the consumer goods sector. Among the most cited risks are: dependence on hydroelectric power, water scarcity and declining in quality.

Sources:

- http://cdpla.net/relatorio/?page=1
- http://gestaoorigami.com.br/capital-natural-transparencia-e-gestao-como-estrategias-de-mitigacao-de-risco/

Slide: Water and Climate for Businesses

- Water risks are rapidly materializing for business.
- Companies disclosed US$14 billion in water-related impacts in the 2016 annual report of the CDP on the corporate use of water (Thirsty business: Why water is vital to climate action – 2016 Annual Report of Corporate Water Disclosure), a five-fold over the previous year (2015).
- Over a quarter of companies have experienced detrimental impacts from water in 2016, and companies expect over half (54%) of the 4,416 water risks they identified to materialize within the next six years.
- The new international scenario to reduce carbon created more demand and pressure to improve water management: the Paris agreement is now an international right, meaning the nearly 200 countries that submitted climate plans are now mandated to deliver emissions reductions.
- CDP's data shows that this will require better corporate water stewardship.
- Fortunately, companies demonstrate awareness and are seeking ways to improve water resource management.
    - Over half of companies (53%) report that better water management is delivering greenhouse gas (GHG) emissions reductions.
    - There is an increase in the number of companies that are recognizing the value of water management in a more holistic sense.
    - More companies are citing water stewardship as the basis for their water targets.

Source:

https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/001/306/original/CDP-Global-Water-Report-2016.pdf?1479747926

Slide: Water risks for businesses

- Whether due to physical or regulatory aspects, companies are increasingly realizing that climate change is a material risk component, and that it will bring constraints on business growth in the coming decades.
- The probability of occurrence of regulatory and physical risks is virtually certain/probable for 66% of companies, while the magnitude of the impact of regulatory risks is high/medium for 51% of companies and 71% for physical risks.
- The expected time horizon for impacts is medium to long-term for both risks, although the uncertainty rate is very high.
- The most mentioned regulatory risk vectors are general environmental regulation, taxation on fuels and energy, as well as international agreements cited with great frequency by the financial and extractive sectors.
- Increased operating costs came to prominence as the most mentioned impact in most sectors, followed by the increase in the cost of capital in the extractive and industrial sectors, precisely those more carbon intensive.
- Physical risks are usually associated with changes in the availability of water resources. Extreme change in precipitation and droughts is often mentioned in the energy, extractive and financial sectors.
- On the other hand, the main identified impacts are reduction/interruption of productive capacity and increase of operational costs, much mentioned in the sectors of consumer goods, energy, extractive, financial and industrial sectors.

Source: http://cdpla.net/relatorio/?page=16

Slide: Type of water use by companies in South America

- Many business models are built on the premise that stable supply of good quality water will always be available. The increase in water stress means that this premise is no longer valid. As a result, water insecurity can bring financial risks to some companies and their investors.
- Most companies that respond to the questionnaire have already realized this critical situation and are working to reduce the use of water in their business. For example, 67% of the withdrawals, 55% of consumption and 69% of water discharges were less than or equal to the previous year (2015).

Source: http://cdpla.net/relatorio/?page=26

Slide: Impact management and value chain

Increased water stress will affect food and energy systems around the world. Agriculture, which currently uses about 70 percent of the world's freshwater, will be hard affected. There will also be an increase in the deprivation of vulnerable populations, increasing the risk of conflict.

According to the analysis of the responses of the Water questionnaire of the CDP's report:

- The main negative impacts companies have on water are physical. Reputational and regulatory impacts are scarcely mentioned;
- The food and beverage sector (consumer goods), because it is highly dependent on the resource, stands out with several internal management strategies to respond to this challenge;
- An example that can be cited is the Ambev company that has the SAVEh (Hydroefficiency self-evaluation System). SAVEh is the platform through which Ambev shares its water management system free of charge with other companies, which has helped reduce the company's water consumption by more than 40% in the last 13 years;
- The main strategies to respond to the impacts related to water suffered by companies are: investment in infrastructure (20%) and new technologies (18%) and the promotion of awareness (12%);
- On the other hand, the extractive and energy sectors prioritize external response strategies such as engagement with stakeholders in the river basin and with public policy makers (governments).

Sources:

- http://cdpla.net/relatorio/?page=27
- https://www.youtube.com/watch?v=JgpThyLnFJQ

Slide: General Motors Company – Brazil

- In some cases, the links between water and energy become explicit, as General Motors Company found in Brazil. Drought pushed up water costs by US$2.1 million in 2015, at the same time as reduced availability of hydropower pushed up electricity costs by US$5.9 million.
- The company responded with increased water conservation efforts and energy efficiency measures.
- In addition to these types of impacts, companies face costs from fines and penalties, delays in permitting, and brand damage.
- The Energy sector is particularly exposed to these impacts, with almost half (47%) reporting paying penalties or fines in 2015.
- The degree of risk for a company is a function of how the availability of water impacts on its business, and how its use of water impacts on people and ecosystems.
- A comprehensive risk assessment is essential for companies to develop a clear understanding of physical, regulatory and reputational exposures as well as opportunities available.

Source:

https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/001/306/original/CDP-Global-Water-Report-2016.pdf?1479747926

Slide: Successful water governance means working together

- For many companies, becoming water secure will require strategic change.
- Such change requires internal engagement at the very highest level.
- Companies working in isolation will struggle to eliminate unsustainable water use. Ensuring water security requires companies to look beyond their direct operations and understand the risks to other stakeholders, from the supply chain to local communities.
- Collective action is required to protect watersheds. In this regard, it remains a concern that companies should undertake a water risk assessment at the river basin scale. In order to take into account, the other water users of the basin.
- Such engagement can also create links between water security and carbon emissions. Collaboration along the supply chain can generate opportunities to reduce greenhouse gas (GHG) emissions, often at a lower cost than a company acting alone could achieve.
- As companies implement long-term plans and strategies to support the Paris Agreement and the Sustainable Development Goals, opportunities exist to make business models fundamentally more sustainable and resilient, by moving from a focus on direct operations to engaging in collective action.

Sources:

- https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/001/306/original/CDP-Global-Water-Report-2016.pdf?1479747926
- https://www.cdp.net/en/reports/downloads/2588

Main impacts of climate change on water resources in the Southeast (SE) Region of Brazil and possible ways to address the challenge

Slide: Effects of climate change on water resources in the SE Region of Brazil

- Brazil is not listed among the countries most susceptible to natural disasters, since it lies outside the pathway frequented by major hurricanes and has no active volcanos or inhabited areas subject to strong earthquakes.
- But this image of a safe place protected from the whims of Mother Nature and geological shocks should be seen in perspective.
- In Brazil, about 85% of disasters are caused by three types of events: flash floods, landslides and prolonged drought.
- These phenomena are relatively frequent in tropical areas, and their effects can be largely attenuated by government policies aimed at damage mitigation.
- According to studies based on climate simulations conducted by Brazilian researchers, the risk of occurrence of these three types of disaster, linked to excessive or too little water, will increase by the end of this century in most of the areas already affected by these phenomena.
- The researchers also point out that new parts of Brazil, generally adjacent to regions currently affected by such occurrences, are likely to become areas of significant risk for these same problems.
- The impacts tend to be greater in the future due to climate change, the growth of city boundaries and populations, and occupation of more high-risk areas

Source:

http://revistapesquisa.fapesp.br/en/2017/05/16/a-more-vulnerable-brazil-in-the-21st-century/

Slide: Effects of climate change on water resources in the SE Region of Brazil

- Climate change is changing the pattern of rainfall in Brazil, particularly in the Southeast. This indicates an article published in the International Journal of Climatology, that points to an average increase in both the volume of water and the average number of days in which it rains in the State of São Paulo. The work was done with more than 70 years of meteorological data.
- In Rio de Janeiro and Espírito Santo, the estimate is for a reduction in the average volume of precipitation for the next years, but with concentration in less days and occurrence of more extreme events. That is, it should rain less, but with more intense rain and more frequent storms.
- It has been observed that rainfall is decreasing in the northern part of the Southeast region, over Rio de Janeiro and Espírito Santo, and increasing in the South. The trend is that this pattern will continue in the next few years.
- These trends are becoming more dramatic. This will get more frequent and worse. Where it rains a lot will rain more. Where there's drought will get drier. The government and the population need to understand what is happening with the climate to plan and better adapt to the changes.
- The concentration of rain in less days in Rio de Janeiro is an indicator of the tendency to aridity, but not the only one. Soil management, its vegetation cover, and factors associated with ecosystem balance are equally important. They are also a possible form of impact in changing the rainfall regime.
- According to the researchers, the changes in the rainfall regime observed for the Southeast region are inserted in a larger context, since one of the most robust signs of climate change in Brazil is precisely the drying in the North and Northeast and the wetting in the South and Southeast
- The drought between 2014 and 2015 is part of a global pattern of extremes. In this period, while droughts occurred in São Paulo, extreme floods took place in the northern region of the country.
- The effects on the city of São Paulo are already being felt with great intensity. The extremes are getting more and more intense. The heat islands in a city the size of São Paulo create conditions for the formation of storms. The proximity of the Atlantic Ocean helps the formation of these storms with the supply of water vapor.

Sources:

- http://onlinelibrary.wiley.com/doi/10.1002/joc.4840/abstract
- http://agencia.fapesp.br/sao_paulo_devera_ter_mais_chuva_nos_proximos_anos_indica_pesquisa/25873/

Slide: Case study of the city of Santos (SP)

- Sea-level rise (SLR) poses a range of threats to natural and built environments in coastal zones around the world.
- Like other coastal cities, the city Santos, at the shore of São Paulo State, Brazil, faces the dilemma of adapting or having to pay the high price of increasingly frequent storm surges and floods.
- Adapting to climate change involves public works that place a costly burden on the budget of any city.
- Strategies for public understanding and awareness of the tangible effects of climate change are fundamental in developing policy actions.
- A multidisciplinary, multinational team of natural and social scientists from the USA, the UK, and Brazil developed the METROPOLE Project to evaluate how local governments may decide between adaptation options associated with SLR projections.
- The METROPOLE Project developed a participatory approach in which public actors engage fully in defining the research problem and evaluating outcomes.
- Using a case study of the city of Santos, in Brazil, METROPOLE developed a method for evaluating risks jointly with the community, comparing “no-action” to “adaptation” scenarios. At the core of the analysis are estimates of economic costs of the impact of floods on urban real estate under SLR projections through 2050 and 2100. Results helped identify broad preferences and orientations in adaptation planning.

Sources:

- http://agencia.fapesp.br/cost_of_not_adapting_to_climate_change_would_be_at_least_five_times_higher_/26110/
- https://link.springer.com/article/10.1007%2Fs11069-017-2855-x

Slide: Case study of the city of Santos (SP)

- A wide-ranging study has concluded that adaptive construction projects in the Ponta da Praia area of Santos and the northwest of the city would cost at least R$300 million.
- On the other hand, failure to adapt to climate change would cost at least R$1.5 billion, in addition to the suffering it would cause the population.
- However, the cost could be underestimated at R$1.5 billion.
- The analysis of health impacts shows how climate change will affect all sectors of society. Investigating the link between rising temperatures and the incidence of dengue, the researchers concluded that expenditure on patient hospitalizations and treatments in Santos would rise by at least R$720,000.
- Among the adaptation options proposed in the study, stand out:
    - Fortification: using revetments, seawalls and structural enhancements.
    - In other cases, it's possible to opt for beach replenishment.
    - Another strategy we see as necessary for Santos is mangrove rehabilitation, which can be classified as an ecosystem-based adaptation.
- In order that the adaptation strategies proposed in the study can be implemented, a high government investment is required.

Sources:

- https://www.youtube.com/watch?v=fpva-Q0paCo
- http://agencia.fapesp.br/sea_levels_along_the_brazilian_coast_are_expected_to_rise_in_coming_decades/25560/
- http://agencia.fapesp.br/coastal_flooding_in_the_city_of_santos_could_cause_billions_in_damage/22129/

Slide: Municipal Climate Change Adaptation Plan (MCCAP) – Santos (SP)

- The results of the research project helped the Municipality of Santos in the elaboration of the Municipal Climate Change Adaptation Plan (MCCAP).
- After a year of work involving several secretariats, the City Council presented the Municipal Climate Change Adaptation Plan (MCCAP) in December 2016, during the Workshop "Immediate and Definitive Engineering Solutions for the Protection of the Santos Bay".
- The city was one of the first cities in the country to create this type of plan. The studies that gave rise to the plan began in December 2015.
- The National Adaptation Plan to Climate Change, of the Ministry of Environment (MMA), was released in May 2016.
- The next step of the plan is to seek greater involvement of the population, civil society, NGOs and institutions with the theme.

Main recommendations of the plan:

- Viabilization of economic, financial and fiscal instruments for the promotion of objectives, guidelines, goals, actions and programs;
- Creation of a database on climate change;
- Encouraging public and private initiatives to mitigate greenhouse gas (GHG) emissions and adapt to climate change;
- Monitoring of health risk factors due to climate change;
- Ensure participation of civil society, NGOs and universities in consultative and deliberative processes related to climate change;
- Create GHG emission reduction goals, with mitigation and adaptation strategies;
- Implement continuous monitoring for risk prevention in coastal areas;
- Optimization of the use and reduction of waste;
- Dissemination of the topic through transparent, scientific and democratic information;
- Encourage the protection and recovery of natural ecosystems;
- Empowering the population to deal with risk situations;

- Introduce measures of energy efficiency, water resources and expansion of green areas.

Sources:

- http://www.cemaden.gov.br/resultados-finais-dos-estudos-sobre-adaptacao-as-mudancas-climaticas-em-areas-costeiras-serao-apresentados-em-santos-nesta-quinta-feira-17/
- http://www.santos.sp.gov.br/?q=noticia/888948/cidade-integra-estudo-pioneiro-sobre-eleva-o-do-n-vel-do-mar
- http://agencia.fapesp.br/nivel_do_mar_na_costa_brasileira_tende_a_aumentar_nas_proximas_decadas/25414/
- http://www.santos.sp.gov.br/?q=aprefeitura/secretaria/meio-ambiente/plano-municipal-de-mudanca-do-clima-de-santos
- http://www.santos.sp.gov.br/static/files/conteudo/Pag_Internas/PMMCS%20Plano%20Municipal%20de%20Mudanc%CC%A7a%20do%20Clima%20de%20Santos%2015-12-%202016%20II.pdf
- http://www.santos.sp.gov.br/?q=noticia/895244/santos-apresenta-plano-municipal-de-mudan-clim-ticas-em-semin-rio
- http://mundogeo.com/blog/2017/08/16/workshop-nessa-quinta-em-santos-sobre-mudancas-climaticas-em-areas-costeiras/

Slide: Effects of climate change on water resources in the SE Region

- The drought in the northwest of São Paulo reached the level of the hydroelectric reservoirs and the most critical situation was registered in the Marimbondo hydroelectric plant in Icém (SP) in September (2017).
- In March, the water level reached 80% and in September marked 23%, according to the National Electrical System Operator of Brazil (ONS).
- The hydroelectric plant has one of the lowest levels in the southeastern region of the country.
- According to the ONS, the hydroelectric power supply was not affected by the low water level because of the Brazilian system. If the power is low, it is compensated in another region of the country that supplies the energy to the lagged location.

Source:

https://g1.globo.com/sao-paulo/sao-jose-do-rio-preto-aracatuba/noticia/seca-atinge-reservatorios-de-hidreletricas-e-usina-de-icem-chega-a-23-da-capacidade.ghtml

Slide: Climate change and loss of coffee production in the states of SP and MG

- Global warming has had significant impacts on agriculture around the world.
- Droughts, torrential rains and out-of-hours frosts can ruin crops, directly affecting food production.
- According to the IPCC, if carbon emission levels are not reduced, the temperature can increase from 2.6°C to 4.8°C by 2100.
- Simulations of the impact of climate change indicate that agriculture is vulnerable to higher temperatures. Thereby, if no additional mitigation measures are taken, the sector will be significantly impacted.
- Data from the Brazilian Panel on Climate Change (a scientific body created by the Ministries of Science and Technology and the Environment) indicate that Brazil could lose about 11 million hectares of agricultural land due to climate change by 2030.
- São Paulo and Minas Gerais are the main two producing states of coffee in the country.
- According to the estimates of the IPCC report released in 2014, the combination of the increase in average temperature and the scarcity of water resources would considerably reduce coffee cultivation – especially the Arabica variation – in these two states.
- Between 1998 and 2008, the state of São Paulo lost 35% of cultivated area with arabica coffee.
- That is why the whole agricultural sector needs to work to mitigate and adapt to the complex challenges posed by climate change.
- Solutions to deal with water deficiency conditions can be found by adopting some adaptive measures, such as planting deeper roots species and genetically modified plants. This measure has been helping to reduce losses in corn and soybean plantations. The investment is high, but the development of heat and drought tolerant cultivars is one of the best ways to ensure crops adapted to climate change.

Sources:

- http://agencia.fapesp.br/mudancas_climaticas_ja_causam_queda_da_produtividade_agricola_no_mundo/19199/
- https://projetodraft.com/mudancas-climaticas-uma-ameaca-a-agricultura-e-a-seguranca-alimentar/
- http://sfagro.uol.com.br/mudanca-climatica-producao-de-cafe-pode-cair-60/
- http://blogs.canalrural.com.br/kellensevero/2017/07/12/mudancas-climaticas-ja-afetam-cafes-do-brasil/

Examples of practices in Brazilian companies

Slide: Nestlé **–** Coffee chain

- Nestlé-sized industries coexist with the challenge of managing the impacts directly associated with their activities – such as the use of natural resources, the generation of waste and the control of atmospheric emissions and greenhouse gases.
- As part of Shared Value Creation (SVC) commitments, the company is engaged in pursuing solutions to improve water use efficiency, to combat climate change and its effects and protect the environment.
- Nestlé works to find solutions with farmers focusing on environmental efficiency, respect for human rights, quality and economic prosperity.
- Nestlé has some initiatives that are being implemented in the Coffee Chain, such as: the NESCAFÉ Plan and the AAA Sustainable Quality Program, which include actions focused on responsible use of water resources and reduction of post-consumption impacts.
- In 2016, weather factors – especially low rainfall indices – significantly impaired coffee production, which impacted the business and challenged the company and its agricultural producers to seek solutions to improve quality and productivity.

Source: http://corporativo.nestle.com.br/asset-library/documents/rs2016_2.pdf

Slide: Nestlé **–** Nescafé Plan

Project data **"Nescafé Plan"** taken from the report: **"**Nestlé na Sociedade – Criação de Valor Compartilhado_2016**":**

- In 2016, according to the report, 11 thousand tons of green coffee were traded via NESCAFÉ Plan.
- In practice, this means that the raw material was generated by agricultural producers undergoing training, technical support and management training and programs for the rational use of resources and reduction of environmental impact.
- Given the change in rainfall, well below historical averages, Nestlé's technical division prioritized training and seminars on the rational use of water with these partners.
- Altogether, 418 producers, professionals and technicians involved in agricultural production were engaged in relation to water use legislation and to the work of the River Basin Committees.

Next steps:

- Since the beginning of 2016, NESCAFÉ Plan has undergone a global review to seek new methodologies for measuring results and building improvement plans for socio-environmental issues.

Sources:

- https://www.nestleprofessional.us/sites/g/files/gfb131/f/media/nescafe-plan-poster.pdf
- http://www.eltiempo.com/multimedia/videos/video/que-es-nescafe-plan/16668949
- http://corporativo.nestle.com.br/asset-library/documents/rs2016_2.pdf

Slide: Nestlé → Nespresso

- Nespresso also seeks to dialogue with local and international partners to develop joint actions on issues such as biodiversity, adaptation to climate change and rural development.
- Relevant local partners include Institute of Ecological Research (IPÊ), Institute of Agricultural and Forest Management and Certification (Imaflora) and International Union for Conservation of Nature (IUCN), in addition to the river basin committees of the regions.
- In 2015, the Consortium "Cerrado das Águas" in Minas Gerais was signed, and the Nespresso maintained its participation in pilot projects related to the recovery of high biodiversity areas responsible for the provision of ecosystem services. This is the case of the Córrego Feio River Basin, in the region of Patrocínio (MG), which now has a multi sectoral project composed of governments, companies and NGOs, in order to recover the micro basin – a major water producer in the region.

Source: http://corporativo.nestle.com.br/asset-library/documents/rs2016_2.pdf

Slide: **Agua Brasil "The Brazil Water Programme"**

- The Agua Brazil Programme is an initiative of Banco do Brasil, in partnership with the Banco do Brasil Foundation, WWF-Brasil and the National Water Agency (ANA). The objective of this initiative is to disseminate sustainable actions, to develop business models and to mobilize the population to improve quality and increase water quality in the country.
- In its first five years, more than 11 million people benefited directly and indirectly from the Water and Agriculture and Sustainable Cities axes of the project.
- In the first cycle, which comprised from 2010 to 2015, the investment was R$58 million.

Sources:

- https://www.unglobalcompact.org/take-action/action/case-example/110
- https://www.wwf.org.br/?51382/Programa-gua-Brasil-lana-nova-fase-com-foco-no-Cerrado#
- http://www.bb.com.br/docs/pub/siteEsp/uds/dwn/AguaResultado.pdf

Slide: Agua Brasil → Main results

- In the face of the water crisis that occurred in Brazil between 2014-2015, the Água Brasil Program addressed practical solutions and generated concrete results to promote the improvement of water resources management and protection of watersheds in response to the national water crisis.
- The Socio-environmental Projects axis worked in the rural area to protect seven Brazilian watersheds: Longá (PI), Pipiripau (DF), Guariroba (MS), Santa Rosa (AC), Peruaçu (MG), Tietê-Jacaré (SP) e Cancã-Moinho (SP).
- This set of actions has improved water governance in these micro-basins, contributing to the principle of multiple uses foreseen in the National Water Resources Policy and for conflict resolution.
- It also protected springs by planting seedlings, restoring degraded areas and disseminating better farming and agroecology practices. For example, in the micro-basins of the Pipiripau, Guariroba and Cancã-Moinho rivers, the Environmental Services Payments (PSA) projects were implemented, generating income for the rural producers through the Water Producer Program of the National Water Agency (ANA). In five years, these places have reached a new level in terms of water and food security.
- The Risk Mitigation and Sustainable Business axes helped to improve Banco do Brasil's agricultural credit policy, incorporating the issue of water security, and contributed greatly to reducing risks and improving water governance in rural areas.
- The Água Brasil Program served as a true testing laboratory, which helped to demonstrate in a practical way the solutions to improve the management of water resources to overcome the water crisis in the country.
- Banco do Brasil, WWF-Brasil, the Banco do Brasil Foundation and the National Water Agency (ANA) worked during these five years with governments and the water user sectors so that the results of this initiative could be used to scale up the knowledge and practices generated. Brazil is a country of continental dimensions, with marked regional differences and which needs proven solutions in the different regions. Therefore, the Water Brazil Programme provided a solid basis for the necessary transformations at the political and local levels.

Sources:

- https://www.unglobalcompact.org/take-action/action/case-example/110
- https://www.wwf.org.br/?51382/Programa-gua-Brasil-lana-nova-fase-com-foco-no-Cerrado#
- http://www.bb.com.br/docs/pub/siteEsp/uds/dwn/AguaResultado.pdf

Slide: **Agua Brasil "The Brazil Water Programme"–** Next steps

- An investment of R$50 million is planned (for the period from 2016 to 2020) with the objective to increase water availability and increase the coverage of native vegetation in the basins served by the Program; develop business models to promote restoration and management of forests, water and energy efficiency; to make society aware of the intelligent use of water and the environment; and to develop new studies and tools for socio-environmental risk management.
- In the field, the program will focus on the Cerrado biome, considered the "cradle of waters" in Brazil. In this region are located two of the most important basins of the country, that is, Amazon and São Francisco. Despite its great importance, the Cerrado is threatened and requires innovative initiatives in water resources management.
- The Brazil Water Programme will also contribute to the achievement of the goals of the Brazil's Nationally Determined Contribution (NDC) – agreement signed with the United Nations for voluntary reduction of greenhouse gas emissions and recovery of native forests, at COP 21, in Paris.

Sources:

- https://www.unglobalcompact.org/take-action/action/case-example/110
- https://www.wwf.org.br/?51382/Programa-gua-Brasil-lana-nova-fase-com-foco-no-Cerrado#
- http://www.bb.com.br/docs/pub/siteEsp/uds/dwn/AguaResultado.pdf

Slide: Case: Braskem

- Braskem carried out a study to identify the potential impacts to its operations in four regions in Brazil, assessing the risks of current and future water shortages by 2040.
- The need to mitigate these risks leads to the definition of targets for reducing water abstraction and the need to engage other actors interacting in these river basins, since actions exclusively internal to Braskem will not suffice to solve the water shortage in the region.
- One of Braskem's practices in water efficiency is the use of water reuse, considering as sources rainwater, treated domestic sewage and industrial effluents. In 2015, the reuse rate reached 25%, with that about 16.6 billion liters ceased to be extracted from water bodies.
- Braskem seeks, in partnership with its customers, to develop applications that contribute to the efficient use of this resource in the supply chain and to reduce water losses in the distribution systems of treated water.

Source: http://cdpla.net/relatorio/?page=28

Slide: International platforms on climate change

Slide: Caring for climate (C4C) platform

- Launched by the UN Secretary-General, Ban Ki-moon, in 2007.
- It is a joint initiative between the United Nations Global Compact (UN Global Compact), United Nations Environment Programme (UNEP) and secretariat of the United Nations Framework Convention on Climate Change (UNFCCC).
- It aims to mobilize a critical mass of business leaders to implement and recommend climate change solutions and policies.

The basic elements of the C4C commitments are:

1. Taking further practical actions to improve continuously the efficiency of energy usage and to reduce the carbon footprint of products, services and processes, to set voluntary targets for doing so, and to report publicly and annually on the achievement of those targets in the Communication on Progress-Climate.
2. Building significant capacity to understand fully the implications of climate change for business and to develop a coherent business strategy for minimizing risks and identifying opportunities.
3. Engaging more actively with national governments, inter-governmental organizations and civil society to develop policies and measures to provide an enabling framework for business to contribute effectively to building a low-carbon and climate-resilient economy.
4. Continuing to work collaboratively with other enterprises both nationally and sectorally, and along the value-chains, to set standards and take joint initiatives aimed at reducing climate risks, assisting with adaptation to climate change and enhancing climate-related opportunities.
5. Becoming an active business champion for rapid and extensive climate action, working with other stakeholders (e.g. other peers, employees, customers, investors and the broader public).

In Brazil the initiative is endorsed by 16 companies:

1. Banco do Brasil S.A.
2. Braskem S.A.

3. Copagaz Distribuidora de Gas S/A - Grupo Zahran
4. CPFL Energia S.A.
5. Dudalina SA
6. Grupo Abril - Abril S.A.
7. InterCement
8. Itaipu Binacional – Brazil
9. MDA Brasil Ltda
10. MDD Comercio e Representacoes de Papel Ltda
11. Natura Cosmeticos S/A
12. Nogueira, Elias, Laskowski, Matias Advogados
13. Quinta da Estancia
14. Sabará Participações
15. Vale S.A.
16. Visao Sustentavel - Dorpas Assessoria Empresarial S/C Ltda.

Sources:

- http://caringforclimate.org/wp-content/uploads/C4C_Statement.pdf
- http://caringforclimate.org/workstreams/transparency-and-disclosure/
- http://caringforclimate.org/about/list-of-signatories/

Slide: Caring for climate (C4C) platform

Workstreams:

- Carbon Pricing: Caring for Climate together with partners – CDP, The Climate Group, UN Foundation, the Principles for Responsible Investment, and World Resources Institute (WRI) – are calling on companies to demonstrate leadership in pricing the cost of carbon emissions as a necessary and effective measure to tackle climate change.
- Science-Based Targets: Science-based emissions reduction goals can help drive innovation and secure long-term competitive advantage. Setting emissions reduction targets is now common practice for business: 80% of the world's 500 largest companies reported targets to CDP in 2015 – however, most of them are not sufficient to meet the risks posed by climate change and keep warming below 2° Celsius. Corporations influence up to 70% of global GHG emissions. If a significant number of these companies adopt and implement GHG emission reduction targets in accordance with the goals adopted in the Paris Agreement, they could substantially contribute to closing the emissions gap left by the country's commitments.
- Climate Policy Engagement: The Guide for Responsible Corporate Engagement in Climate Policy issued by Caring for Climate in partnership with WRI, CDP, WWF, Ceres and The Climate Group in November 2013 at COP 19 established a set of core principles and actions for companies to engage constructively in climate change policy debates. Business leaders are in a unique position to inform and advance effective responses to climate change. The publication sets guidelines for why and how companies can provide constructive influences on public policy in support of an effective global climate change agreement.
- Climate Adaptation and Resilience: Caring for Climate aims to highlight leading corporate adaptation actions to show the benefits of adaptation and community resilience for the private sector.
- Transparency and disclosure: Caring for Climate signatories commit to communicate on an annual basis on progress made in implementing the five areas of commitments of this initiative. As such, the Caring for Climate "Communication on Progress" (COP- Climate) is an important demonstration of a participant's endorsement of the initiative and its objectives.

Why should companies engage in this initiative?

- Demonstrate leadership in advancing practical solutions and strategies addressing climate change;
- Increase visibility;
- Communicate publicly a company's actions on climate change;
- Share best and emerging practices and gain access to the experiences of peers;
- Shape the climate change policy agenda and call for policy frameworks that reward leadership and innovation.

Sources:

- http://caringforclimate.org/about/join-caring-for-climate/
- http://caringforclimate.org/workstreams/

Slide: Business Alliance for Water and Climate (BAFWAC)

- BAFWAC was jointly launched by CDP, CEO Water Mandate, SUEZ, and World Business Council for Sustainable Development (WBCSD) in December 2015.
- The initiative commits companies to analyze and report water-and-climate-related risks and impacts, and to implement collaborative response strategies along the value chain.
- Currently, the initiative has 50 member companies, but the goal is to reach 100 by 2018.

Key objectives are to:

- Increase the number of companies committed to BAFWAC actions;
- Ensure broad uptake and action on improving water security from the private sector;
- Track progress from committed companies as to their progress on each of the three areas of action.

The three areas of action are:

- Climate resilient agricultural supply chains;
- Circular water management: water reuse and resource recovery;
- Natural infrastructure (including hybrid green/grey solutions).

Sources:

- https://wateractionhub.org/cop21-declaration/
- https://bafwac.org/

Slide: Business Alliance for Water and Climate (BAFWAC)

- Platform for members to gain/share knowledge.
- The toolbox provides guidance, case studies, best practices and tools to help companies make progress on the BAFWAC commitment areas.
- When companies feel ready to engage in collective action, they can go to the Water Action Hub.
- The Water Action Hub is an online platform designed to assist stakeholders to efficiently identify potential collaborators and engage with them in water-related collective action to improve water management in regions of critical strategic interest.
- There are links between projects in the Water Action Hub with the Sustainable Development Goals (SDGs), for example: SDG 6.1 and SDG 6.2 (increase access to water, sanitation and hygiene) and SDG 13.1 (climate resilience and adaptation). This makes easier for companies to be involved in water stewardship with a focus on achieving the SDGs.
- In 2017 and in the coming years, CEO Water Mandate intends to include case studies that contain examples of good water and climate practice on the initiative website. CEO Water Mandate is also looking to work with companies on the implementation of these practices.
- The initiative will also look to integrate the topic of water and climate at high level convening such as at the upcoming COP 23 conference (November 2017 – Germany).

Sources:

- https://wateractionhub.org/cop21-declaration/
- https://bafwac.org/