WATER CYCLE MANAGEMENT: PARTNERSHIPS AND STRATEGIES TO COMBACT CLIMATE CHANGE EFFECTS

Giuseppe Bortone
General Director, Arpae Emilia-Romagna
Emilia-Romagna Region and Gauteng Province together to combat climate change

Climate change presents worldwide challenges and risks to **environment** and **economies**, impacting **human health**, increasing **extreme weather events**, threatening **natural resources** and triggering forced **migration** of populations.

**Impacts** from climate change are already inevitable due to the **greenhouse gas emissions** already resident in the atmosphere.

At the same time, climate change **responses** and **solutions** create **economic opportunities** and benefits through **sustainable energy and development**.
Climate agreements

Gauteng Province approved Gauteg Climate Change Over-Arching Strategy

Emilia-Romagna Region signed “Under 2° MoU Agreement” Climate Change
Similar impacts of climate change on water cycle: Emilia-Romagna

The impact of climate change on water cycle in Emilia-Romagna: Summer temperature (average on 1961-2015 values)
Similar impacts of climate change on water cycle: Emilia-Romagna

The impact of climate change on water cycle in Emilia-Romagna:
Annual rainfall (average annual rainfall)

Period 1: 1961-1990

Similar impacts of climate change on water cycle: Gauteng

The impact of climate change on water cycle in Gauteng:

“At a national level, trends in precipitation patterns for the interior of South Africa include a significant increase in total rainfall (1921-2015) as well as increases in extreme daily rainfall events.

Some evidence points towards the intensification of drought conditions as related to the intensification of rainfall extremes at the cost of the duration of rainfall events or seasons. Rainfall in South Africa is highly variable though, which makes the discerning of a long-term trend difficult.”

GAUTENG CITY REGION, Over-Arching Climate Change Response Strategy, Status Quo Report 2017
Similar impacts of climate change on water cycle

The impacts of climate change on water cycle in Gauteng and Emilia-Romagna are similar:

✓ higher frequency of extreme events

✓ draught and water scarcity

✓ temperature increase in average 1.1 °C
Strengthening commitments

On 18 October 2016 a Memorandum of Understanding (MoU) was signed between the Italian Ministry of Environment (MATTM) and the South African Minister of Water and Sanitation for a support from Italy in the water management sector.

The MoU is a tool to promote an integrated approach to water management, through:
✓ capacity building activities
✓ pilot projects
✓ technology transfer
✓ technical assistance

Funds by MATTM will support feasibility and pre-feasibility studies, whereas the procurement phase will be approved by the JC and managed by the South African Government.
Strengthening commitments

The multi-year operating Plan will focus on the following priorities:
A. Strengthen South Africa capacity of facing the current challenge of climate change
B. Identify measures to ensure regional resilience to water issues
C. Cooperating – at regional level – in the fields of education, R&D, water quality, services, sanification, food nexus
Strengthening commitments

In October 2017, the partners strengthened the commitment for climate change actions with particular concern to:

- agriculture
- food security
- water management

as reported in the letter of President David Makura to Emilia-Romagna Region President Stefano Bonaccini.
Lines of action proposed by Emilia-Romagna Region for water cycle risk management

DISASTER RISK REDUCTION AND MANAGEMENT

• Increased Protected agriculture mitigating adverse weather
• **Climate-Smart Agriculture**
• **Precision Farming:** Crops & Soil Monitoring, Weather Monitoring, Air Monitoring

WATER

• Water saving technologies / automation technologies
• Water harvesting technologies
• Wastewater production, treatment and reuse - integrated waste system.
Emilia-Romagna water cycle management partners and subjects

**Arpae**
Arpae is the Regional Agency for Prevention, Environment and Energy of Emilia-Romagna, Italy. Arpae aims to support sustainability, protection of health and territorial competitiveness.

**Canale Emiliano Romagnolo – CER**
CER is an artificial water systems made up of a main canal designed to be 150 km long and a number of lower order canals delivering water mostly for irrigation purposes to a territory spanning over 3000 km² in ER. Since 1959 CER Consortium has been in charge of research on irrigation and providing technical assistance and training to farmers for the efficient use of irrigation water.

**Terra&AcquaTech**
Terra&Acqua is a network of 8 research units which gathers expertise of University of Ferrara in applied research and technology transfer related to soil/water issues, and, more widely, to the environment protection and sustainable development of the territory.
Key leverages for an effective water management

✓ Information and adaptation strategies:
  • Reliable climate information, including seasonal predictions and future projections, and effective early warning systems for extreme weather and other climate-related events (i.e. to inform adaptation planning and disaster risk reduction/management).
  • New and adapted technologies/knowledge and other cost-effective measures (e.g. nature-based solutions) used in climate change adaptation.

✓ Tools:
ER Available tools for irrigation and water management:
  • Moses (Arpae)
  • Irrinet (CER)
  • Water leakage and precision farming (Terra&Acqua)
The main objective of MOSES is to put in place and demonstrate – at real scale of application - an information platform devoted to water procurement and management agencies (e.g. reclamation consortia, irrigation districts, etc.) to facilitate planning of irrigation water resources.

Aims:
• managing and reducing the risk of droughts and their impact
• saving water
• improving services to farmers
• reducing monetary and energy costs
ER available tools: MOSES (Arpae)

The platform results from the trans-disciplinary integration of many different innovative approaches like satellite remote sensing, seasonal and medium-term weather forecasting, agronomic modelling, economy, and online GIS Decision Support System (DSS).

Its main functionalities are:

❖ Seasonal probabilistic forecasting /downscaling
❖ Early in-season crop mapping
❖ In-season water demand monitoring
❖ Long and medium term irrigation water demand forecasting

The DSS for the reclamation consortia and similar bodies aims at the optimal management of irrigation water both from the point of view of procurement and distribution to the consortium members.

The dss consists of a forecast phase, based on methodologies developed in Arpae in the recent past and a summer monitoring phase, based on methods developed by other partners.
**ER available tools: IRRINET (CER)**

**IRRINET** is a service provided by CER to all farmers in Emilia Romagna. It is a free service that provides irrigation advice on time of intervention and volumes to be used to obtain a quality product saving water resources. It is based on the Water Balance method which is calculated every day with:

- meteorological data supplied in real time by the Arpae-Simc (Hydro-Weather-Climate Service)
- the pedological data supplied by the Seismic Geological Survey and Grounds of RER
- the groundwater data of the network of the RER Agro-food System Development Services
ER available tools: Water leakage and precision farming (Terra&Acqua)

Water leakage and precision farming developed by Terra&Acqua
The activity aims to improve the productivity of agriculture as well as to reduce the environmental pollution, through a management strategy supported by modern tools for the execution of agronomic interventions. It takes into account the actual needs of cultivation, soil physical and biochemical characteristics.

Data acquisition: UAV and flight pattern
RGB map
NDVI (Vigor map)
Prescription map
Thank you

Giuseppe Bortone
gbortone@arpaе.it