

14/02/2022 - Italian LAB on Water Resources - 1st meeting 9: 30-12: 30

Participants:

1. Anna Sperotto (B3c)
2. Camilla Iuzzolino (RER-Serv.tutela)
3. Cinzia Alessandrini (ARPAE)
4. Cristina Voltolini (IRETI)
5. Elisa Brunelli (CB Burana)
6. Emanuele Cimatti (RER-Serv.tutela)
7. Fabio Paglione (CB Burana)
8. Fausto Tomei (ARPAE)
9. Francesca Renzi (GECO)
10. Gabriele Antolini (ARPAE)
11. Giulia Villani (ARPAE)
12. Jaroslav Mysiak (CMCC)
13. Laura Vicini (IRETI)
14. Paolo Gelli (HERA)
15. Paolo Mazzoli (GECO)
16. Stefano Bagli (GECO)

9.45-10.00- Intro

Welcome to the guests and short presentation of the activities of the Host GECOSistema with focus on the research activities in which it is involved and their objective (TALANOA projects - but also ICISK and UNTWIST), followed by the presentation of the objectives and the agenda of the day.

10-10.30 - Icebreaking, stakeholders introduce themselves

Jaroslav Mysiak (CMCC)

Offers a brief overview of recent R&D activities on *Climate change and water resources* of inspiration for the activities of the Lab including CLARA, Climate Europe (on the standardization of climate services (flood modeling, damage assessment and cost and benefit analysis of adaptation policies) and TANALOA water (constructive dialogue between stakeholders for the definition of shared policies on the rebalancing of the water balance

) *SaferPlaces*. Opportunities from the EU mission on *Climate change* are outlined, such as economic support for regions with the aim of improving risk estimation, adaptation strategies, activating innovation laboratories for local solutions to be replicated on a large scale.

Stefano Bagli (GECOsistema)

GECOsistema is an engineering company with experience in the field of climate data and services. In today's context, acting often in R&D as purveyor (supplier) between data providers and end users, through a bottom-up approach, with the aim of developing climate applications and services that meet customer needs, representing an added value for them.

Cristina Voltolini (Geologist, IRETI, a company of the IREN group)

IRETI is the company of the Iren Group that manages the distribution of electricity, gas and water in an integrated and widespread manner throughout the country. In particular, the water service in some provinces of the Emilia Romagna and Liguria regions. It deals with services to water distribution networks (derivations, quantity, quality). Also present Eng. **Laura Vicini**, specialized in environmental engineering.

Fausto Tomei (ARPAE hydro-meteorological service)

Previous experience: participation in the CLARA project. Focus on two main aspects: production of weather data on the regional territory, experience on the water balance.

Elisa Brunelli and Fabio Paglione (Burana Consortium)

Recent previous experience of R&D: participation in the CLARA project for the development of climate services in agriculture.

Areas of interest: Modena, Bologna, Ferrara and partly Mantua. Focus: Drainage of water, supply of irrigation services to agricultural users (management of distribution and withdrawals).

Paolo Gelli (HERA) - water treatment and sewage system manager for HERA Spa

HERA deals with the integrated water service of the Emilia-Romagna area from Modena to Rimini. There is interest in knowing more about the impact of the CC on the water resource. To underline the recent collaboration with UNIBO and regional ARPA, on the theme of withdrawals from the aquifer.

Cinzia Alessandrini (ARPAE climate observatory)

Focus on hydrological monitoring and forecasting with use of models. Elaboration of observed and forecast data datasets, drafting of weather and agrometeo bulletins, nitrate bulletins in support of the region. Previously worked in AIPO Interregional Agency for the river PO.

Gabriele Antolini (ARPAE climate observatory)

Focus on agrometeorology and climatology, participated in the development of weather data management modeling and software for seasonal forecasts / irrigation needs (CRITERIA), generation of regional datasets to describe the climate of the past (Regional Climatic Atlas). He is active in the regional working group on the impacts of climate change.

Camilla Iuzzolino (Emilia Romagna Region)

Serving the water framework directive for the Region, she follows sector planning such as the district management plan and the regional water protection plan. The revision of the water protection plan is currently being launched, where the regional strategies will be updated, passing from the policy plan to the operational plan. Water balance of Apennines

rivers is still to be implemented and is a topic of interests. Participation in the activities is aimed at treasuring all the projects that are being developed, with the aim of making them concrete and feasible in the regional territory.

Emanuele Cimatti (Emilia Romagna Region)

Focus on saving and preserving water resources in all sectors, drought, and attention to the use of the tools and results developed as a communication vehicle on environmental issues, in particular that of water.

Giulia Villani (CLIMATE Observatory)

Training in agrometeorology, participation in the CLARA project for the development of a climate service of regional irrigation forecasts, water balance model fed with seasonal forecasts to provide information on irrigation needs (CRITERIA). In addition to scientific development, the service provided the opportunity to reflect on the structure of the service itself, through a process of co-design and co-development to ensure that the final result is easily usable for the stakeholders.

Anna Sperotto (BC3 postdoctoral researcher)

Works on the UNTWIST project: Focus on how ecosystem services can contribute to the connection between water, food, energy, to optimize the use of resources and reduce conflicts. Past experiences on the topic of the impacts of climate change on water quality, worked for CMCC in the past by participating in various projects (PROLINE-CE, TEACHER-CE) on water resources.

10.30-10.45 - Introduction on Climate Services

The meeting proceeds with a general introduction on climate services by **Stefano Bagli (GECOsistema)** starting from the definition of what is meant by climate services: some fundamental aspects that are underlined that are based on data (the so-called big data), extracting value with the aim of improving the decision-making process and at the same time the collaboration between data providers and end users.

Ideally, the CS should have these characteristics:

- easily accessible
- consistent with the timing necessary to feed the decision-making process
- respond to opportunities: provide information, anticipate and be able to seize opportunities

Can therefore be used by different users:

- multiutility such as HERA, IREN
- regulatory bodies, managers of current and future water resources
- policy makers
- citizen / consumer

The climate service must be tailored to the different needs of the user.

data providers are provided *upstream*:

ECMWF - Copernicus, CDS

SMHI - Swedish Meteorological and Hydrological Institute

CMCC - Euro-Mediterranean Center on Climate Change

In this context, GECOSistema acts as a Service Purveyor, favoring the interaction between data providers and users endings. Finally, the two example services developed on the topic of water resource management in the previous CLARA project are presented: SmartRIVER and IRRICLIME.

10.45-11.00 - Break

11.00-12.00 - Identification of the area of interest

In order to identify the type of climate service to be developed as well as the pilot area in which to focus, each of the participants was asked to contribute, guiding the discussion on some key points:

- Hotspots of interest
- Variables or indicators of interest
- Time horizons
- What action you could take once you know this information
- Further Stakeholders that could be impacted
- Services currently used
- Availability of data
- Conflicts for the use of the resource

The discussion is summarized below for Stakeholders:

ARPAE- Fausto Tomei, Giulia, Cinzia Alessandrini

Hotspot / area of interest

Irrigation channels in the Secchia and Panaro basins

Variables or indicators of interest

Historical data on the volumes withdrawn for irrigation use and the relative distribution area that are used for calibration and validation of their irrigation forecasting service over the entire region.

Time horizons

Weekly / aggregated data by season (JJA)

Climate services already used:

They are suppliers of a CS developed in CLARA and operational since 2020 on Consorzio Burana, Consorzio Renana, Consorzio Romagna "*Climate services for irrigation forecast*" (MOSES)

<https://servizigis.arpae.it/moses/home/>

Service: CLIMATE SERVICE FOR IRRIGATION FORECASTING

Data availability

They can provide:

Data on meteorological and agro-meteorological variables (air temperature, precipitation, relative air humidity, solar irradiance, wind) for the whole region on the grid (5kmx5km) (see ERG5 dataset).

Weekly irrigation forecast (produced every day) on irrigation deficit, forecast rainfall, FTE, necessary irrigation (Polygons based on crops from 1 to 100 ha)

Seasonal irrigation forecast (2 per year MJJ and JJA) as an anomaly of seasonal irrigation demand (mm). Polygons based on crops from 1 to 100 ha.

Particular interest was highlighted in the withdrawal data (history of withdrawals), already positioning ARPAE as a *service and data provider*.

Consorzio Burana - Elisa Brunelli and Fabio Paglione

The Consortium works actively with ARPAE to improve the services in use, providing information and knowledge on the area where it manages both the reclamation service (the canalization network to drain and remove flood waters throughout the 'year), the irrigation for users and the management of the water resources withdrawn from the Secchia, Panaro Samoggia and Po rivers.

On a few pilot areas they have maximum withdrawal flow rates and volumes.

It has been outlined that the network of canals is not an aqueduct, it is not possible to close an area and simply transfer the resource, but a minimum level must be maintained throughout the network.

Interest in the perspective of climate services that are inserted in decision-making systems and also allow to support local projects and request for funding for interventions in the territory.

Variables or indicators of interest:

- **Hydrometric levels** within river

courses It would help to alert and prepare for compliance with the minimum vital flow (do not take water, diversify the supply). Information on Incoming Flow would also be useful (less available from existing monitoring networks).

- **Predictions of rainfall and temperature variables.**

For example, the impulsive summer events upset the needs, the intense rain produces damages, the amount rained is not usable and therefore is not a wealth for the crop.

The interest is both in the short term (days, weeks) and in the impact of CC due to the effect this will have on the worsening of water crises.

Emilia Romagna Region - Camilla Iuzzolino- Emanuele Cimatti

Hotspot / area of interest

Castellarano weir - as a basin and a section of examples, it is the crossroads on which several withdrawals from different potentially conflicting usages (irrigation, hydroelectric, industrial). Furthermore the river has environmental criticalities for the achievement of the objectives of

the Water Framework Directive. The different uses have different horizons and types of usage rights to coordinate.

Time horizon:

- medium-long term, decision-making support for planning (in the perspective of climate change) for the balance of the water balance and quality of water bodies
- medium-short term (management of pre-emergency, pre-alert and pre-scarcity situations, both drinking and irrigation use), resource management among users in case of scarcity.

Climate services already used:

It already uses climate services from ARPAE and the data from the monitoring network, again from ARPAE. Regional representative agree with ARPAE and the Consortium on the need for reliable availability (in lean periods) and withdrawal data (complete and referring to actual consumption, concession is granted on the maximum flow rate as it is the maximum instantaneous potential impact on the environmental system)

The use of innovative services and data is aimed at ensuring that the impact of the withdrawal does not compromise the environmental status of water bodies, in order to guarantee sustainable exploitation over time, today and in the future, in particular for priority uses. Particular interest in a service that allows to estimate the impact and availability of the natural water resource.

There are a number of critical issues, including the need to have consistent and reliable withdrawal data (which is being addressed with ARPAE).

An attempt was made to define a lean monitoring sub-network on the Apennine regional water bodies.

The short-term node is the management of conflict situations: different users with different withdrawals (industrial, irrigation, hydroelectric).

Variables or indicators of interest

Difficulty in collecting **sampling data** on both surface and groundwater.

There is a lot of information on consortium data, the consortia manage the service for monitoring and distribution, but all the information for the private part is missing (for example the wells). **Flow data / flow forecast.** While there is much data on the Po river, for other regional water bodies (especially in torrential conditions), most of the stations have been identified to measure the flood regime while there are few suitable stations for the lean regime. The hydroelectric plants present on the Secchia could be an additional source of data on availability having the obligation to monitor the derived and returned flows.

The available data are difficult to use for the forecasting aspect and it is difficult to directly manage periods of scarcity on the Apennine water bodies, which are not very resilient and in which reaction times are very compressed, but for this reason they are fragile and require attention. Therefore more accurate data is needed in order to plan and identify strategies for

the resource and connected environments. This criticality occurs above all for the sections in Emilia, such as the area of interest, in relation to the morphological characteristics.

The importance in perspective also for users of concessions is emphasized to equip themselves with advanced tools such as resource forecasting systems and CS in general, in order to demonstrate that every effort has been made for the optimal management of the withdrawal and to support the strategies of savings, as a rewarding element in the event of resource allocation during periods of scarcity and redefinition of rights in areas of water deficit.

Fabio Paglione (Consorzio Burana) underlines in this regard how having irrigation forecast services goes precisely in this direction, entailing a direct and indirect benefit for users, these services optimize irrigation, help to demonstrate that they have used the water resource at better, and also favor correct communication with users, for example, if there is a need to adopt a strategy with users, especially in case of drought.

IRETI - Cristina Voltolini, Laura Vicini

Hotspot / area of interest

Traversa di Castellarano where IRETI manages an industrial aqueduct (not drinking water) that serves the Sassuolo ceramic district. The permission is numerically smaller than the other existing ones (for example Concession for agricultural irrigation use, hydroelectric use) is managed by IRETI but the owner is ATERSIR. The weir is managed by the *Emilia Centrale* reclamation consortium, in the hydraulic node of Castellarano the conditions of summer water scarcity are recurrent due to the concomitance of low supplies and greater withdrawals.

Variables or indicators of interest.

Flows / flow forecasts. In the Apennine streams the measurement of the discharge is very complex and this is a limit also due to the variable nature of the river section which can change its shape after each flood.

Climate services already used:

The strategies that are implemented are the observation of groundwater levels (underground water has more resilience), while for the verification of the minimum vital flow (DMV) IRETI relies on the services of ARPAE and region, in particular those relating to drought and desertification <https://www.arpae.it/it/temi-ambientali/siccita> (monitoring station in Lugo sul Secchia)

A flow forecast service would be very useful for the management of dry periods, the industrial aqueduct can draw from water superficial (for legislative reasons and by its very nature, it was established in order not to burden the aquifers) and cannot rely on others sources in case of water shortage.

Additional Stakeholders who could be impacted and therefore involved

Since ATERSIR is the owner of the derivation for the aqueduct part and the Emilia Centrale Reclamation Consortium for irrigation use, these should be involved in the event that work is being done on Castellarano.

In addition, IREN Energia, which manages the hydroelectric plant on the Secchia, should be involved, even if it operates in winter.

Other:

The hydroelectric power plant on the right side of IREN Energia can only swirl in winter. The problems in the Apennine river network are also the winter lean; in general, however, in the summer, competition for the use of the resource increases and therefore water scarcity is heavier. To calculate the needs of an aqueduct, they refer just to the lean flow rates, because industrial aqueducts should always work guaranteeing continuity.

So far no conflictual relationship has emerged: on average it is a concession of 150 l / s (much lower than the quantities involved for other uses, which are not fully exploited)

HERA- Paolo Gelli

Hotspot / area of interest

Agrees on the node Castellarano weir as an area of interest for the pilot case. The HERA derivation concession is at the height of Sassuolo and allows the conveyance of water to the ceramic district, with infrastructure up to Modena. withdrawals amount to hundreds of thousands of cubic meters / year, 50-60 users connected to this plant, especially ceramics, for industrial use.

Variables of interest

Flow rates / availability forecast. Having more reliable information on water availability could be useful for expanding the customer portfolio, being certain of being able to guarantee the DMV in the riverbed.

Interest: to understand how to enhance infrastructure that is currently underutilized compared to derivation concessions. It needs a stronger support tool than the current one to manage the leads.

In addition, there is a whole Modenese aqueduct system based on the groundwater system, a withdrawal system with interconnection and balancing between the various withdrawal mechanisms, with a mutual aid logic.

For drinking water, the source of supply is different.

From the Secchia river HERA does not directly own the concessions, so it should also involve other actors such as ATERSIR.

Conclusion of the session

Having heard the Stakeholders, we move on to the final discussion to identify the study area by summing up the discussion; **Paolo Mazzoli (GECOsistema)** proposes, based on what is highlighted by the Stakeholders and the different interests expressed, to concentrate the activities of the laboratory on the Castellarano weir, with focus on the flow (resource) available over different time horizons of interest (days, weeks, season), identifying the real amount of withdrawals by querying the concessionaires and evaluating the overall water balance of the node (in current and Climate Change conditions).

Although this point is not the main node of derivation of interest for all the Stakeholders at the table, it is nevertheless the one that sees them all involved.

The proposal obtains the unanimous consent of all the participants. The

Burana Consortium also underlines how their derivation is physically managed by the Consorzio dell'Emilia Centrale, which then turns a part of the derivative to the Burana Consortium, offering to contact them to involve them and to organize a *field visit* at the right time.

Paolo Mazzoli (GECOsistema) highlights the peculiarity linked to the availability of real data on the flow rates in the pilot case. While there are many stations that monitor the hydrometric levels (for which to switch to the flow rates it would be necessary to resort to a year-by-year flow scale provided by ARPAE to be requested) for the flows on the Secchia the station called "Lugo" despite being located upstream of the Castellarano hydraulic node already produces flow rate data in real time. **Camilla Iuzzolino (Emilia Romagna Region)** and **Cristina Voltolini (IRETI)** confirm that this station can be considered representative for the Castellarano flows since after this station, before the intake work, there are neither dissipative withdrawals (only hydroelectric with return) nor large significant tributaries, especially in lean periods.

Fausto Tomei (ARPAE) reports how the flow data of the Secchia river in Lugo station are organized more clearly on the ARPAE website (compared to the historical Dexter database also managed by ARPAE): <https://www.arpae.it/it/temi -environmental / drought> , where it is possible to make comparisons between flow rates and hydroclimatic balance in different years.

12.00-12.30 - final notes and next steps

In conclusion, Paolo Mazzoli (GECOsistema) and Anna Sperotto (BC3) illustrate some questionnaires on the topic of water resource management and the impact of the CC that will be shared with the participants in the coming days, with the aim of implementing the analysis of the missing information and the " identification of further stakeholders to add to the laboratory, as well as to define the strategy to be implemented. The questionnaires range from the perception of the role of ecosystem services, to contextualize the case study and the ongoing conflicts, to some more specific questions on the needs / needs of end users. The group agrees on the next steps

Stakeholders: feedback on the questionnaires for the first week of March (preferably) , the laboratory work is updated at the next direct meeting, with the developments of the initiatives in act indicatively by the summer

GECO: contact ATERSIR, Consorzio Emilia Centrale, IREN (hydroelectric) to expand the platform of participants (end of the month), with the help of the Stakeholders who have the contact details and who can possibly become promoters of a first contact (Consortium, Region and IRETI) (end of month).

GECO & Stakeholders: there will be an e-mail exchange for the identification of any data available directly from the Stakeholders and an estimate of the retrieval times.