INCREASING THE VALUE OF METEOROLOGICAL OBSERVATIONS FOR WATER RESOURCE MANAGEMENT: THE CASE STUDY OF MONTE BALDO

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THE PROJECT FORALPS (www.foralps.net)

Monte Baldo has been adopted as a case study within the project FORALPS ("Meteo-hydrological Forecast and Observations for improved water Resource management in the ALPS"). FORALPS is supported by the European Union within the European Regional Development Funds (ERDF) under the initiative Interreg III B "Alpine Space" (cf. "The project FORALPS", poster session, ICAM 2007).

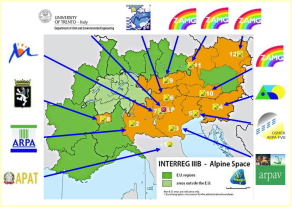


Fig. 1: Map of the FORALPS Partnership

MONTE BALDO FEATURES

The mountain chain of Monte Baldo, in the southern Prealps, lies between the Lake Garda and the Adige Valley (Fig. 2). It is about 36 km long and 11 km wide and is composed of a main chain, with an elongated crest about 2200 m high in NNE-SSW direction, and a series of various surrounding elements, such as small ridges, plateaus, steps and natural terraces.
Ranging from 65 m a. m. s. l. of Lake Garda up to about 2200 m a. m. s. l. of its main crest, Monte Baldo displays a remarkable variety of geographical characters and ecosystems, in particular flora, after which it deserved the name of Hortus Europae (Garden of Europe). This variety is reflected in its territory, which includes various particular kinds of economic activities, ranging from tourism to industrial and business activities, to mountain houses and alpine meadows for cattle breeding, and some minor ski resorts.

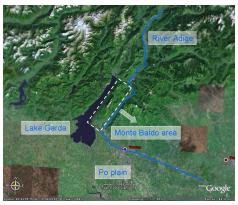


Fig. 2: Overview of Monte Baldo, a "balcony" in the Prealpine chain facing the Po Plain.

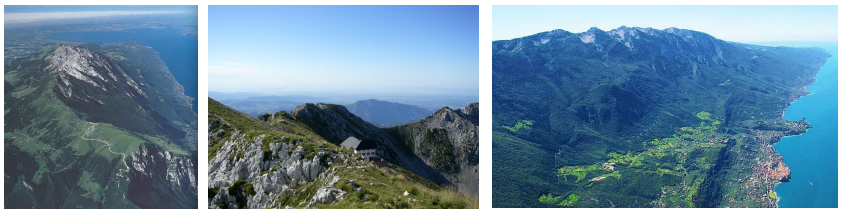


Fig. 3,4,5: Overviews of Monte Baldo underlining its particular morphology

METEOROLOGICAL MONITORING

SITUATION IN THE PAST

About 30 years ago the National Hydrographic Service was in charged of the management of the hydro-meteorological network in Italy and all the data were collected and archived. During the '70s this role passed to Regional Offices that autonomously decided the change, decommitment or substitution of many stations.

Fig. 6: Present state of the weather station network

Only in the River Adige Valley (East of the Baldo chain) several weather stations were installed and the climatology of the area was well monitored; the measured data were validated, collected and archived in the italian periodic publication "Annali Idrologici".

SITUATION IN THE PRESENT

Nowadays there is a severely inhomogeneous distribution of the weather stations in the area: in particular in the southern part (Verona) the only stations remaining were installed and are currently being operated only by amateurs in meteorology.

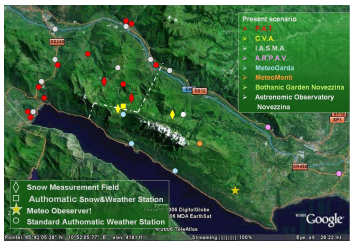
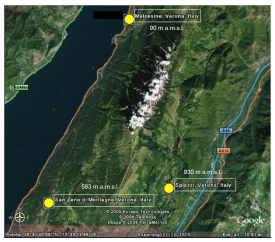


Fig. 7: Past state of the weather station network

Along the main chain, where orographic factors mostly influence the weather at local scale, there is no meteorological station. The unique exception is the weather station at the refuge Fiori del Baldo (at 1815 m a. m. s. l.), installed and managed by the owner of the refuge.

ANALYSIS OF PRECIPITATION DATA

The elaboration has first considered the precipitation set of data directly useful for the water management. Three records of data from as many weather stations, representative of the local territory, were selected for the period 1950-1974: the stations (Fig. 8) are Spiazzi (south-east part of the Monte Baldo, 930 m a. m. s. l.), San Zeno di Montagna (south west part of the Monte Baldo, 583 m a. m. s. l.) and Malcesine (along the northern Garda Lake coast, 90 m a. m. s. l.).



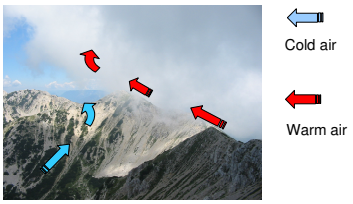
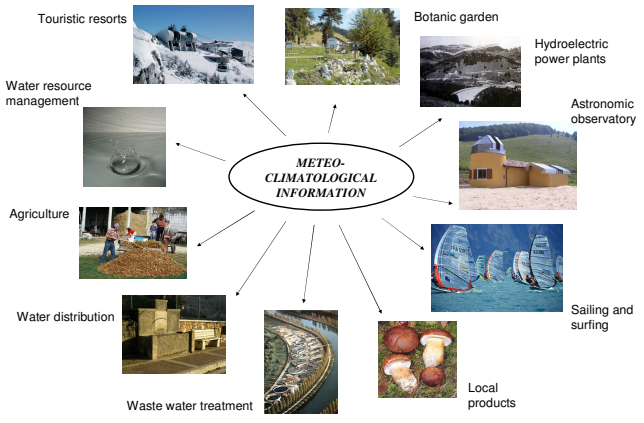


Fig. 8,9 :Localization of the three rain gauge used for the study (left) and example of orographic factor (righ).

The elaboration of monthly and seasonal data allowed to point out different trends that are traced to the effect of local meteorological forcing such as the presence of Lake Garda: this water body determines at this scales effects much more evident from the analysis of extreme events such as intense precipitation or hail, really frequent in the west part of the Monte Baldo, even at intermediate altitude and originating from the moist atmosphere upon of the lake. The Monte Baldo chain, with its position, looks like an obstacle to the movement of this phenomena that are deviated more frequently to the city of Verona than to the Adige valley.

APPLICATIONS OF METEO-CLIMATOLOGICAL INFORMATION IN THE AREA

The Monte Baldo area is populated by several end users, stakeholders, local institutions and decision makers interested in the improvement of the meteorological monitoring of the area.



The work of recovering as many information as possible carried out in the framework of the project FORALPS should be a sample of the richness and utility of these information that should be maintained not only for the present but also for the future, especially in such a delicate mountain environment, where economic activities can produce significant impacts.