ORIGINAL ARTICLE

An archive for the history of limnology in Verbania Pallanza (Northern Italy)

Rosario Mosello*

National Research Council, Water Research Institute, Largo Tonolli 50, 28922 Verbania Pallanza, Italy

ABSTRACT

Since 2010, work has been underway to curate and catalogue the historical documentation archive of the Verbania Pallanza section of the CNR Water Research Institute, located on the shores of Lake Maggiore in the Italian subalpine area. Italian limnology took its first steps here in the first half of the 1900s with the activity of Marco De Marchi. It then developed professionally from 1938 with the foundation of the Italian Institute of Hydrobiology, based in De Marchi's villa in Verbania Pallanza. The curation of the archives dating from these earliest times to the present has been done with professional archivist technicians from the Archival Superintendence and in collaboration with researchers from the Institute. The archived documents include those from the first phase of the organization of the Institute, as well as those derived from scientific and administrative activities and exchanges with the Ministry of Education. The documents also cover activities at a second section of the Institute, located in an ancient historical residence in Varenna, on the shores of Lake Como. The archive has a photographic section, which includes a series of photographic glass plates, digitized to allow for current use, containing photos of the Institute's environments and laboratories at different times through its history. A third section of the archive consists of around 50 interviews with aquatic scientists on topics related to research projects carried out in the past. A further section concerns the recording of about 150 seminars on environmental research carried out in the institute between 2015 and 2020. The main research topics considered concern physical, chemical and biological limnology, with particular attention to Lake Maggiore, Lake Orta (severely polluted in the past due to industrial waste), and high-altitude lakes in the Alps. The Institute also houses a library dedicated to environmental issues and some miscellaneous papers by the most important scholars of freshwater science in Italy, with publications starting from the second half of the nineteenth century. Other collections of archival interest are a museum of field and laboratory instruments, and a collection of biological samples, mainly plankton, collected in various Italian lakes.

INTRODUCTION

The Verbania Pallanza branch of the Water Research Institute was founded in 1938 with the title "Istituto Italiano di Idrobiologia Dott. Marco De Marchi" (Fig. 1). However, the archive includes materials and documents starting from the first half of the nineteenth century, thanks to the activities of De Marchi himself (Fig. 2), one of the first scholars to deal with limnology in Italy (De Marchi, 1910, 1912; Corti, 1941). He was a pupil of Pietro Pavesi (Fig. 3), professor at the Pavia University, who first introduced limnological studies in Italy, from contacts he had with François A. Forel at the University of Lausanne, Switzerland. Forel is credited with founding the study of lakes with modern ecological criteria (Blanc, 1912; Forel, 2012; Vincent, 2019), and he had many stimulating exchanges with Pavesi, whom he greatly respected as a friend and colleague, writing in volume 3 of his monograph: "He [Pietro Pavesi] is the author of excellent and classic works on the Italian lake fauna; it is he who discovered and studied the pelagic fauna of the lakes of Italy, and his experience in the question [of the evolutionary origins of lake plankton] is as vast as his knowledge is deep" (Forel, 1904) The Verbania Institute thus has historical connections dating back to the origins of limnology.

De Marchi carried out his early limnological studies from the building of the current institute, his summer residence on the shores of Lake Maggiore, and from a second villa in Varenna, on Lake Como (Fig. 4). In Pallanza De Marchi also equipped a laboratory for the treatment and examination of the plankton samples that he collected, and he set up a library with books and journals in this field of study. On the death of De Marchi (1936), his widow Mrs. Rosa De Marchi Curioni donated the two buildings to the Italian State so that they could become an institute for the study of the hydrobiology of inland waters, in memory of her beloved husband (Armocida, 1988).

From an institutional point of view, the Verbania institute has passed through five main evolutionary steps. It was founded as an autonomous body in 1938, in 1954 it was transformed into a legally recognized entity, in 1977 it was incorporated into the National Research Council of Italy (CNR), and then in 2002 it was com-

Corresponding author: rosario.mosello@irsa.cnr.it

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bined with other CNR institutes operating in the environmental sciences, in Florence, Pisa and Sassari, to form the Institute of Ecosystem Study. More recently, in 2018, as part of a further CNR restructuring, the laboratory merged with the CNR Water Research Institute, in which it currently operates.

Since the early years of activity, the Institute has assumed a central role in hydrobiological and ecological studies in Italy, thanks to the qualified management work initially carried out by Edgardo Baldi (director from 1939 to 1951) (Fox, 1951; Tonolli, 1951, Huber- Pestalozzi, 1952), then by Vittorio Tonolli (1951-1967) (Goldman, 1968), and subsequently by Livia Pirocchi Tonolli (1967-1979) (Fig. 5, de Bernardi, 1987). These directors all surrounded themselves with highly motivated and qualified researchers and technicians. Pallanza became the seat of specialist meetings, national and international conferences and a point of reference for studies on inland waters in Italy by foreign researchers and institutions (Hutchinson, 1968; Edmondson and Edmondson, 1990). The contribution of important Italian scholars, such as Adriano Buzzati-Traverso and Luigi Luca Cavalli-Sforza, allowed limnological and ecological research to be extended to the genetics of populations (Buzzati-Traverso, 1947; Buzzati-Traverso *et al.*, 1948; Cavalli Sforza, 1945, 1949). Numerous Italian and foreign guests, established students and researchers, have also attended the institute for long periods, contributing to an exchange of knowledge and experiences that have enriched and diversified the ongoing research activities (Lehman, 1998, 2000).

The scientific and administrative activities carried out in 83 years since its foundation, combined with the previous ones relating to the researches of Marco De Marchi, have left a considerable amount of documents concerning aspects relating to the Institute and, more generally, to studies on waters carried out in Italy and abroad. Even part of the instrumentation used in the field and laboratory activities was still available, although sometimes in a bad state of conservation. In preparation for the events to celebrate the 75th anniversary of the foundation of the Institute (2013), in 2011 a reorganization of this material was started, to guarantee its conservation and document the history of the research carried out, in the wider context of national and international contacts that have developed with the investigations.

This article aims to describe the contents of these re-

Fig. 1. Istituto Italiano di Idrobiologia, Verbania Pallanza (1958).

sources, with a focus on the documents archive, including correspondence, papers, reports, journals, books, photographs and audio files. The miscellany of scientific literature by various scholars present in the library, and the scientific journal managed since 1940 by the Institute is also described here, along with the actions carried out over time to preserve and make this heritage accessible to scholars and the public.

COMPOSITION OF THE DOCUMENT ARCHIVE AND PHOTOGRAPHS

The ordering and cataloguing criteria of the archive was done by the Archival and Bibliographic Superintendence of Piedmont and Valle d'Aosta, an organ of the Ministry for Cultural Heritage and Activities and Tourism, competent for the territory of Verbania. An expert archivist thus proceeded to examine the available material, indicating a subdivision of the material into three collections, detailing the first collection in series, relating to the period prior to 1938 until 1979, comprising the first phase of the Institute's activity as an autonomous body (Tab. 1). This part is undoubtedly the most interesting from the point of view of scientific activities and work organization, and also the one requiring the greatest care in conservation.

The archive as a whole includes four types of docu-

Tab. 1. Hierarchical structure of the archive.

Archives
1) Istituto Italiano di Idrobiologia «Dottor Marco De Marchi» (1938-1977) a. Foundation (1938-1943) b. Administration (1939-1979) c. Finances (1939-1979) d. Ministry of Education (1951-1979) e. Scientific activity (1941-1978) f. Varenna (1844-1979)
2) CNR-Istituto Italiano di Idrobiologia (1978-2001)
3) CNR-Istituto per lo Studio degli Ecosistemi (1 January 2002 to 2018)

Fig. 2. Marco De Marchi.

Fig. 3. Pietro Pavesi.

mentary material, which are summarized as follows.

1. Letters, correspondence, administrative-financial documents, research programs, employee personnel files, disciplinary regulations. Of particular interest is the correspondence between Edgardo Baldi, first director of the Institute, and the lawyer Diego Martello, president of the Board of Administration, guarantor of the scientific and economic activities of the Institute. In these documents Baldi systematically and in detail reports all the activities and scientific contacts carried out, making it possible to reconstruct in detail the events going on in the institute at the time. Many documents refer to ongoing research and related scientific contacts. The minutes of the Board of Administration and other financial documentation are of special interest. Also noteworthy is the material relating to the Varenna headquarters, an ancient villa with park, originally a monastery of nuns (13^{t} -16th century), containing documentation and watercolour sketches of the villa and gardens (Scotti, 2001).
2. Iconographic material consisting of photographic glass plates (10 x 8.5 cm), black and white film negatives (24 x 36 mm), photographs and colour slides, relating to different themes and events, natural environments, research campaign, photomicrographs of organisms, group pictures of scholars attending conferences and meetings held in the Institute. A list of the most important set of images is shown in Tab. 2. Among the oldest photos, the collection by Rina Monti Stella (Figs. 6 and 7), a pupil of Pietro Pavesi, is relevant, relating to her research on alpine lakes carried out in Val d'Ossola and Valle d'Aosta at the beginning of the last century (Baldi, 1938; Droescher, 2007; Maffei, 2014; Mosello and Fontaneto 2018). A more substantial collection consists of 1038 glass plates, very well preserved, concerning images of the building of the Pallanza Institute, with interiors of laboratories, library and offices, and of the Varenna's branch; landscapes (lakes, glaciers, alpine environments); microphotography of plankton and other organisms; portraits of scientists, groups of participants in symposia and congresses held in Pallanza. The author is Edgardo Baldi, first director of the Institute, an expert photographer specialized in the microphotography of biological samples, a subject on which he left us, in addition to numerous

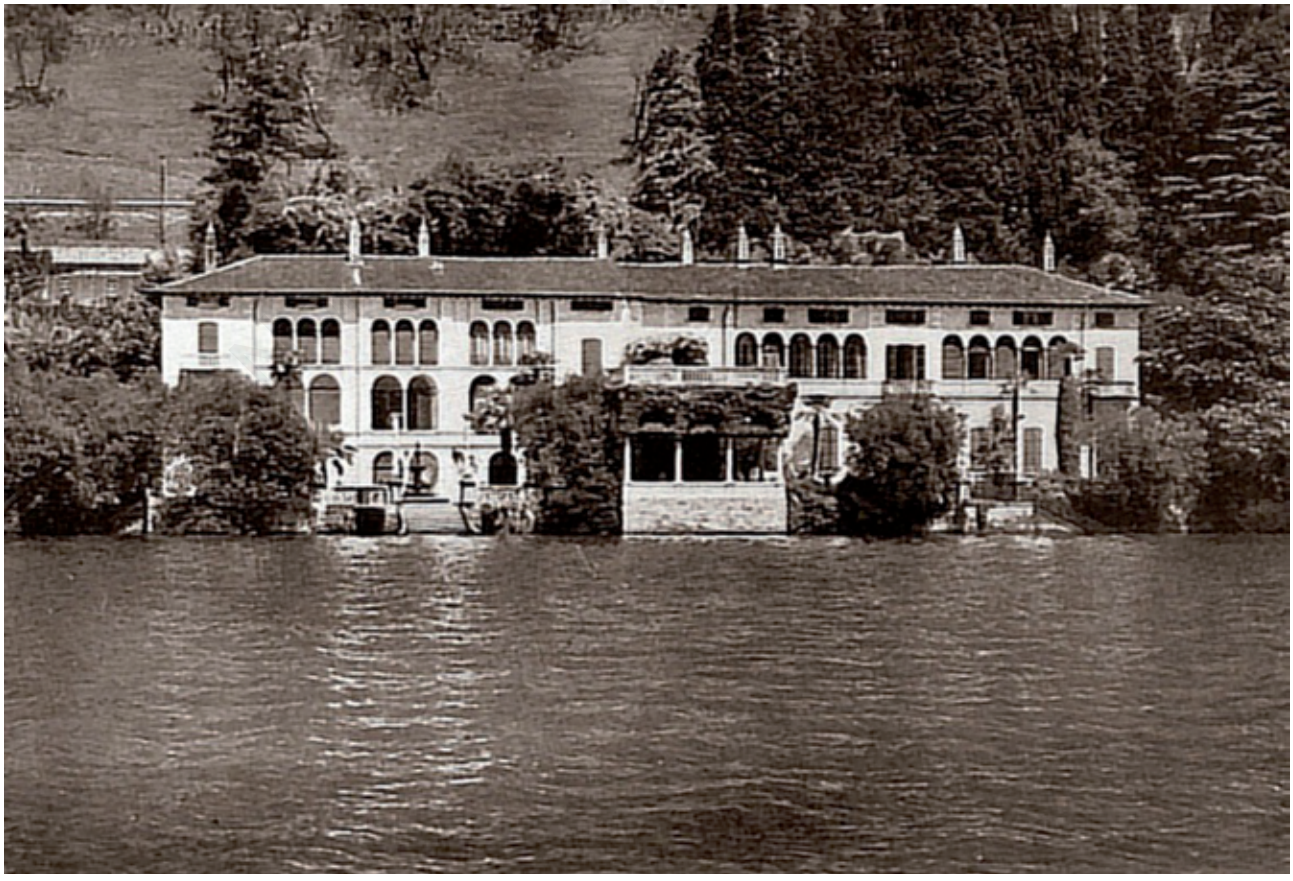

Fig. 4. Villa Monastero, on the shore of Lake Como, Varenna.

high-quality images, works on the technique of microphotography (Baldi, 1939, 1946). The images of the photographic plates have been digitized to make them of widest utility. A further archive, also initiated by Edgardo Baldi, then continued by Livia Pirocchi Tonolli, concerns over a thousand 24 x 36 mm acetate films, relating to different themes: fish, fish farming, Villa Monastero, staff and guests of the institute and participants in symposia and conferences held in the institute. In addition to this set of older images, there are slides of numerous studies carried out through research projects by the staff in Italy and in other geographical areas (Antarctica, Himalaya, Argentina, Svalbard Islands, *etc*.), not yet catalogued.

3. An archive of about 600 envelopes containing documents, correspondence and scientific material used for the preparation of scientific papers by the staff and guests active in the institute, relating to the period from 1940 to 1990. In some cases, the documentation is particularly detailed, including field and laboratory data used for the elaboration, details of the analytical and counting activities, the correspon-

Tab. 2. Photographic collections present in the archive.

Fund name	Period	n° photos	Topics	Supports
Rina Monti Stella	1900-1910	36	Alpine lakes	Glass plates12x10 cm
Edgardo Baldi	1930-1940	1063	Alpine lakes, Lake Tovel, plankton microphotography, various	Glass plates10x8.5 cm
Photo negatives envelopes Baldi-Pirocchi	1935-50	1000	Val Sesia, Val d'Ossola landscapes and lakes, field activity, microphotography	Acetate b/n 24x36 mm
Photo negatives film rolls Baldi-Pirocchi	1945-50	603	Fish farming, characters, Varenna Villa, various	Acetate b/n 24x36 mm
Institute photos Pallanza and Varenna Tonolli	1958	37	Institute building, laboratories, boats	Photographic prints
Slides Baldi-Pirocchi	1945-50	56	Lake Tovel (Dolomites, NE Italy)	Slides
Oscar Ravera	1940-97	110	Various	Photographic prints
Archives of former employees	1950-1990	48	Various	Digital images

Fig. 5. Edgardo Baldi and Livia Pirocchi Tonolli.

dence between researchers and local authorities. In some cases, these aspects have been found to be useful for verifying the methodologies and quality of the old measurements, to assess their comparability with the most recent data, fundamental aspects for evaluating the evolution of chemical or biological characteristics of the environments examined. Investigations largely concern the subalpine lakes, mostly focused on lakes Maggiore, Orta, Mergozzo, Varese, and high altitude lakes in the Alps. The detailed researches carried out on Lazio lakes and artificial basins are also well documented.

4. Recordings of about 50 interviews dedicated to people and environmental research activities in Italy, released by researchers, former employees and guests, recorded between 2012 and 2019, available in digital files in mp3 audio format. The topics mainly focus on the Institute's research activities and on topics relating to the history of limnology in Italy. These testimonies allow us to better understand the personality of researchers who worked in the Institute and aspects related to research projects that normally do not find space in scientific publications, but which are nevertheless useful for reconstructing the evolution of thought and the setting of environmental studies, the interrelationships both nationally and with foreign countries, the evolution of the processes of dissemination and public awareness of environmental issues. Some interviews concern the activities in the institute of researchers and technicians transferred to Pallanza in 1943-45 by the University of Pavia, including Adriano Buzzati-Traverso (Cassata, 2013) and Luigi Luca Cavalli-Sforza (Cavalli-Sforza and Cavalli-Sforza, 2005) due to the bombings on the city. The relations with partisans, sought by the Nazi-Fascist troops, who found refuge in the Institute during the period Oct 1943-Apr 1945, at the end of the Second World War, are also of historical interest.
5. Audio recordings (mp3) and images (Adobe Acrobat pdf or Microsoft Power Point) of about 150 seminars held in the Institute of Ecosystem Study in the period June 2015 - February 2020, including the flyer showing the speaker's data and the summary of the communication, together with photographs taken during the events. The topics range from specific aspects relating to individual research projects to more extensive summaries on the activities of groups in Italian and foreign study centres. The environments considered are mainly inland or marine waters, their populations and problems related to different forms of pollution and climatic variations.

Fig. 6. Rina Monti Stella.

REORDERING AND DIGITIZATION OF THE ARCHIVE

The reorganization of the archive began in 2010, for needs related to research activities on Alpine lakes, with the digitization of the Baldi photographic fund (plates), thanks to a contribution from the VCO Community Foundation. In 2011, as part of the events organized to celebrate the 75th anniversary of the foundation of the Verbania institute, a more extensive project to reorganize the historical heritage began, to preserve existing materials, make them available for consultation in the institute, and through the web, using specific software. The organization of the documentary material was carried out with the advice of the Archival Superintendence of Piedmont and Valle d'Aosta and with the contribution of an expert external archivist, indicated by the Superintendence itself.

CNR personnel have participated in coordination, historical classification and for digitization aspects, while cataloguing was carried out by contract staff, thanks to contributions from the CRT Foundation (2013-18). A significant part of the reorganization of the archive was also carried out as part of a project financed by the Piedmont Region, relating to the pollution and rehabilitation of Lake

Orta, over a period of 60 years (Rogora *et al.*, 2016; Manca *et al.*, 2016), constituting an aspect of great social and environmental importance in Italy.

The most significant part of this material was digitized on xDams ver. 3.0.0 of the company Regesta (http://www.xdams.org/). In 2014 it was possible to put on the internet a first part of the documentation catalogued with xDams (http://www.vb.irsa.cnr.it/archivio), followed by regular updates on an approximately half-yearly basis.

The dissemination of the various topics examined has been and is the subject of presentations in various scientific and environmental dissemination events. Among the first

Tab. 3. Composition of paper and book collections archived in the library.

Collection	Miscellaneous	Books
Pietro Pavesi (1844-1907)	Over 6500 papers, some with author's dedication	-
Alfredo Corti (1880-1973)	-	ca 100, (end of '700 - early '900)
Marco De Marchi (1872-1936)	ca 850 papers	ca 220, (end of '700 - early '900)
Edgardo Baldi (1899-1951)	ca 3500 papers	ca 500, (end of '700 - 1950)
Vittorio Tonolli (1913-67) Livia Pirocchi Tonolli (1909-85)	-	ca 700 (early '800 – end of '900)
Oscar Ravera (1925-2015).	ca 14.000 papers	-
Luigi Provasoli (1908-92)	ca 300 papers	ca 40 (early '900- end of '900)

Fig. 7. Rina Monti Stella and her brother Achille at Zyole Lake (2500 m as.), Valle d'Aosta.

national and international conferences (*e.g.*, AIOL Ancona, SIL Turin). Among the second type of events, those related to EXPO 2015 and the European Heritage Days. Topics in the archive have been the subject of scientific works and popular publications, public conferences and seminars for students. Part of the material and papers produced in this way are available at: http://www.vb.irsa.cnr.it/archivio/pubblicazioni. A collaboration is also underway with the Information Services Office of the CNR in Rome, through participation in the Science and Technology Digital Library project (https://www.cnr.it/it/news/6518/science-technology-digital-library).

OTHER MATERIAL OF HISTORICAL INTEREST PRESERVED AT THE INSTITUTE

The specialized nature of the studies conducted in the institute and the distance from university centres made a well-equipped library of books and magazines indispensable for the needs of research, with greater attention to the issues of limnology and ecology of inland waters. There are also many texts relating to oceanography, marine ecology, botany, zoology, and other environmental disciplines. The book holdings total around 7500 volumes, of which 1500 are of historical-scientific importance.

Some miscellaneous collections are part of the library, covering different historical periods, starting from the first half of the nineteenth century. Among these, the most important are those of Pietro Pavesi (1844-1907), Marco De Marchi (1872-1936), Edgardo Baldi (1899-1951) and Oscar Ravera (1925-2015), for a total of about 25,000 scientific articles (Tab. 3). To these is added the miscellany of the Italian Institute of Hydrobiology, started since 1938, containing about 60,000 extracts of publications published by the staff of the Institute or received in exchange, and numerous "gray literature" documents consisting of technical reports and manuals. About one thousand of these publications have been digitized for use by the Institute's researchers. The publications held in the library and in the miscellaneous books are listed in: http://polarcnr.area.ge.cnr.it/cataloghi/ise_vb/index.php?type=Serials—

Another important documentation of the development of research activities is the Institute's journal, the *Memorie dell'Istituto Italiano di Idrobiologia* (Memoires of the Italian Institute of Hydrobiology) (1942-1998). Initially dedicated mainly to the activities carried out by staff and guests of the institute, since 1989 it has also been open to external contributions, with an international editorial board. Of interest in these volumes are also the "activity reports" carried out by the director of the institute in office, which constitute a very useful historical document to reconstruct the evolution of research activities, the main acquisitions of instrumentation, the staff of the Institute and the guests present, with documentation of the research activities carried out (*e.g.*, Baldi, 1947, 1949). In this sense, they are a useful guideline for the documentary material present in the historical archive. Since 1999, the Institute's magazine has accentuated its international character, opening up to greater external contributions, with a change of name to "Journal of Limnology" (https://www.jlimnol.it) but maintaining the numbering to follow on the Memorie series. The journal is open access and is indexed by Scopus and the Directory of Open Access Journal (DOAJ), and is well recognized among international limnological and hydrobiological journals (Vincent, 2019).

The archiving and care of historical material also involved the scientific instrumentation used over a century in limnological investigations, recently made open to visitors with an original museum arrangement in the room that constituted the underground ice house located in the garden of the Institute (http://www.vb.irsa.cnr.it/crypta). A catalogue of this instrumentation was published by the curator Roberto Bertoni, who describes the individual pieces and, where possible, describes the research context in which they were used (Bertoni, 2015). The relevance of this scientific heritage is further illustrated in this volume (Bertoni and Bertoni, 2021), where a more exhaustive catalogue of the collection of scientific instruments is also presented.

A plankton museum is also set up at the Institute, which houses a collection of over 4,000 samples of phytoplankton, zooplankton and fishes collected over a century of investigations. Part of these samples lend themselves well to morphometric and DNA investigations, using the most recent techniques developed on this second theme. The digitization of the cards with the composition and counting relating to the individual samples is currently underway, and soon will be available on the archive website.

DISCUSSION

Two aspects of the historical material collected and preserved in Pallanza deserve special mention. The first relates to the considerable heterogeneity of the materials, which include documents of different nature, images, photographs on different media, recordings of interviews with researchers active in the environmental field, seminars held in the Institute, tools used for campaign and laboratory activities, and miscellaneous publications by scientists about their limnological studies, as well as books and journals. Among the latter, a particular role is played by the *Memorie dell'Istituto Italiano di Idrobiologia*, today Journal of Limnology, published by staff of the Institute, which from 1938 until the 1980s has documented the activities carried out in the limnological field in the Institute. This diversity of materials obviously requires different

methods of conservation and access, with the aim of making all of it available to different categories of users, from historians interested in the development of environmental sciences, to students at all levels.

The second point is the unity and specificity of the scientific context that these materials document, relating to the study of inland waters in their pristine state and in relation to the alterations caused by human activities, during a period of over a century and a half. Since the study of freshwater ecosystems, understood in the current meaning, began with the studies of F.A. Forel on Lake Geneva in the late 1800s (Vincent and Bertola, 2012), it can be said that the material available covers this type of limnological study from its very beginnings, with great detail for Italy, but also with much information from international sources. It is thus possible to reconstruct, among many aspects, the different purposes of the research in the first half of the 1900s and in the decades following the Second World War, when the considerable economic and industrial development caused severe environmental imbalances, with inevitable consequences on the quality of the waters throughout the world.

The focus on specific fields of study, and the heterogeneity of archived materials, are traits common to most museums and collections with technical or scientific themes. However, it must be emphasized that such a focus on the study of inland waters is a unique theme in the Italian context. To search for similar collections in the Italian territory, some catalogues available on the web were consulted, but the most reliable information was obtained from a guide to Italian museums and scientific collections (Bozzo 2005). This catalogue considers 766 museums, of very different dimensions, from the important institutes of many large cities, to the university and institute collections of the CNR, to collections of technical schools or schools managed by municipalities or private associations. Most of these last collections are not considered by the complex legislation existing in Italy which, for historical reasons, mainly focus on the historical and artistic heritage (Canadelli, 2011, 2019). The examination of the preserved materials and the topics covered by these museums shows that the theme of inland fresh waters is almost absent, both for the aspects concerning the description and the history of the studies conducted on these ecosystems. Among the few cases reported are the aquarium and civic hydrobiological station of Milan (Canadelli, 2008) and some other aquariums, for example that of Trento. More numerous (but less than 12; Bozzo, 2005) are the museums and archives on marine environments and research, a result of the greater number of institutes that deal with this topic in Italy. Some of these institutions have a long tradition of studies, which results in libraries and archival material containing information also about research on inland waters.

CONCLUSIONS

The organisation of the archive has involved contacts with numerous Italian and foreign institutions dealing with ecology and conservation of documents, such as the Civic Museum of Natural History in Milan, the Lombard Institute of Sciences and Letters in Milan, the Museum of Sciences of Trento, the Forel archives at the Musée du Leman in Nyon (CH), and the University of Colorado, where the archives of the International Society of Limnology (SIL) are kept. A particularly fruitful relationship has been established with the University of Pavia, where Pietro Pavesi and his pupil Rina Monti Stella were based, and who developed limnology in Italy by setting up research laboratories at the universities of Pavia and Milan (Baldi, 1938; Ranzi, 1987; Droescher, 2007; Maffei, 2014). It is from this cultural root, based on experimental research that, through Edgardo Baldi and Livia Pirocchi Tonolli, pupils of Rina Monti Stella, the Italian Institute of Hydrobiology began to operate in 1938, and continues for many decades to this day as the reference point for limnology in Italy, in close contact with researchers throughout the world and well connected to international limnology (Mosello, 2020).

The topics considered in the CNR-ISE archive (water ecology, fish and fishing, shores and related settlements, alpine environment, landscape, climate), constitute topics of broader interest, such as the history of the territory and the development of environmental research in Italy. Research on alpine lakes, which strongly marked the first phases of limnological research, takes on particular importance assuming progressively different meanings and values over time, up to the current definition of these environments as "early warning systems" with respect to the effects of climatic variations (Marchetto, 1998, Rogora *et al.*, 2020).

The historical material is also of great help in the dissemination activity for students and people interested in the environment, thus contributing significantly to one of the aspects of the CNR's activity, referred to as the "third mission", concerning the enhancement and use of knowledge to contribute to the social, cultural and economic development of society and to make the motivation and objectives of scientific research more accessible to the general public.

The interactions with other institutions and scholars active in different fields have led to the establishment of important collaborations, such as the one with the Promotion of Library and Archival Heritage of the Piedmont Region, in the research on the first phase of pollution of Lake Orta (http://www.vb.irsa.cnr.it/it/archivio/orta).

Looking to the future for the Verbania Pallanza archive, a further step to take is a unified and comprehensive enhancement of the different types of materials of

historical interest listed above, for diverse user needs. To this end, it is essential to complete the sorting and cataloguing of the materials, making them accessible inside and outside the Institute via the internet and using all possible channels of scientific and media dissemination.

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