

Dams and territories: ITCOLD's initiatives to promote proactive dialogue

Barrages et territoires : les initiatives d'ITCOLD pour promouvoir un dialogue proactif

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Abstract. In Italy there are over 530 large dams mainly for energy production and water supply. At present, the multipurpose use of water resources is strongly influenced by problems related to the aging of dams and the ongoing climate change which affects the water availability. On the other hand, the European energy and climate directives require to preserve the existing hydropower generation and to increase storage capacity to better exploit non-programmable renewable energy sources. These choices require the identification of methods and actions to deal with the complex relationship between the dams and their host territories which represents a critical point on the way to attain the energy and climate goals considering that part of the media and public opinion often have a negative view on the role of dams and reservoirs. These considerations are at the basis of the regional initiatives "Dams and territory" promoted by ITCOLD (Italian Committee on Large Dams) which since 2014 has organized annual workshops whose aim is to promote dialogue between dam owners and interested parties to identify a point of balance between the various interests that sometimes conflict with each other. The paper represents an updating of the work presented during the 10th ICOLD European Club Symposium held in Antalya (Turkey) on October 2016 and synthesizes the results gathered in the 6 workshops held so far. The project could represent a possible point of reference for other countries wishing to undertake similar initiatives.

Résumé. En Italie, il existe plus de 530 grands barrages destinés principalement à la production d'énergie et à l'approvisionnement en eau. À l'heure actuelle, l'utilisation polyvalente des ressources en eau est fortement influencée par les problèmes liés au vieillissement des barrages et au changement climatique en cours qui affecte la disponibilité de l'eau. D'autre part, les directives européennes sur l'énergie et le climat exigent de préserver la production hydroélectrique existante et d'augmenter la capacité de stockage pour mieux exploiter les sources d'énergie renouvelables non programmables. Ces choix nécessitent l'identification de méthodes et

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d'actions pour faire face à la relation complexe entre les barrages et leurs territoires d'accueil qui représente un point critique sur la voie de l'atteinte des objectifs énergétiques et climatiques considérant qu'une partie des médias et l'opinion publique ont une vision négative sur le rôle des barrages et des réservoirs. Ces considérations sont à la base des initiatives régionales « Barrages et Territoires » promues par l'ITCOLD (Comité italien des grands barrages) qui organise depuis 2014 des ateliers annuels dont le but est de promouvoir le dialogue entre les propriétaires de barrages et les parties intéressées pour identifier un point d'équilibre entre les différents intérêts qui sont parfois en conflit les uns avec les autres. Le document représente une mise à jour des travaux présentés lors du 10e Symposium des clubs européens ICOLD qui s'est tenu à Antalya (Turquie) en octobre 2016 et synthétise les résultats rassemblés dans les 6 ateliers organisés jusqu'à présent. Le projet pourrait représenter un point de référence éventuel pour d'autres pays souhaitant entreprendre des initiatives similaires.

1 Introduction

Water, unlike other commodities or raw materials, is a vital resource not substitutable in its most essential uses. There is a growing variety of uses of dams and of the water resources they store. Sometimes, these uses do not have anything to do with the main productive purposes (basically, electricity generation, water supply and irrigation), but can be very important for local communities. It is the case of touristic uses, ensuing from the landscape transformation due to the dam, but also of the uses concerning civil protection (e.g. flood control, draught relief, water supply for fire-extinguishing, etc.) and other productive uses.

The issue of measuring and managing the impact of large dams on their environmental and territorial setting has gained the attention both of dam owners and of stakeholders throughout the world. The study conducted by the World Commission on Dams (WCD) (World Commission on Dams 2000) has represented a first attempt- even if rather controversial - to provide a general overview of the issue. However, according to many commentators, the WCD Report provided a biased picture, since it mainly focused on the environmental, social, and economic impact of very large dams in developing countries. The analyses and the recommendations of the WCD do not seem to apply equally well to mature economic and technological contexts. Moreover, the framework adopted in the WCD study fails to record all the different activities that are pro-actively undertaken by dam owners with the aim of facilitating the integration of dams in their social and natural environment. However, the positive contribution of the WCD Report consists in having nonetheless pointed out the most important trends that are gaining momentum within the field of large dam management: the ever more complex and multidimensional nature of the impact, the need for an integrated approach to address this impact, the growing relevance of voluntary actions on the part of owners, the importance of forms of participation and co-operation in order to elaborate intervention strategies in a systematic relationship with all stakeholders.

The mitigation of social and environmental impact of large infrastructures demands ever more comprehensive and integrated strategies that have to be based on scientific and technical data keeping duly into account the perception of the local stakeholders (i.e. local authorities, associations, community-based organizations, the public at large). Cost/benefit approaches are often adopted as methodologies for assessing the impact of dams on the host territory: costs are normally identified with negative externalities, whereas the benefits correspond to more or less direct forms of compensation for those externalities. A crucial role is played by policies promoted by the different actors involved in the process to enhance communication and participation of all stakeholders.

2 The Italian experience

In a global context characterised by a growing concern for the issue of sustainability, several organisations of the field, as well as several managers of large dams, have proven to be particularly pro-active, developing innovative approaches and investing resources and research to this end. The Italian case mirrors, in many respects, the European situation.

After the issuing of the WCD Report [1], within the frame of research activities supported by the Italian Ministry of Economic Development, targeted field analyses have been promoted, with the goal of identifying and describing best practices in the management of dams, being their main functions the production of electricity (AEM, Valtellina, Northern Italy, now incorporated in A2A company), water supply (Romagna Acque, Ridracoli, Central Italy) and multi-purpose uses of water (Consorzio Velia, Salerno, Southern Italy) [2, 3]. In each of the three cases, the process of planning, construction and management has been flanked by an intense activity of contracting with local authorities and interest groups. The aim was addressed at allowing a smooth placement of the dam in the host territory, a fair distribution of (economic, social, environmental, etc.) costs and benefits arising from the presence of the dam, and the setting up of institutionalized mechanisms to ensure the participation of local interests in shaping the future modifications in the dam's life-cycle.

The description of these best practices has indeed allowed elaborating hypotheses to be tested, rather than conclusive evaluations. In this perspective, a need for a wider investigation to analyse the policies performed by dam owners and, in parallel, to measure the perception of stakeholders emerged quite evidently.

ITCOLD, the Italian Committee on Large Dams, starting from the best practices described above, has promoted an investigation on this subject through the appointment of the Working Group "Benefits and problems connected to large dams: social and environmental impact management" whose Terms of Reference basically refer to the analysis of the social, economic and environmental role of dams and to the relation between dams and hosting territory.

Thanks to the support offered by the Italian Ministry of Economic Development, a model addressed to highlight the pro-activity of dam owners towards the hosting territory has been set up. Basically, the Dam Owners' Model aims at assessing the macro-fields of dam owners' interventions: environmental management actions, promotion of local development, transfer of water and money resources to the territory [4, 5, 6].

The implementation of the Dam Owners' Model was based on a questionnaire through which the dam managers are asked to report on the actions that they have undertaken in the fields of environmental management and local development. The typologies of initiatives taken into account concern direct actions as well as compensatory flows of either money or water resources, voluntarily distracted from productive purposes. Further, the model aims at providing a first sketch of the state of interaction between dam owners and the variegated world of environmental and socio-economic stakeholders.

The Dam Owners' Model includes a list of variables, which correspond to the various actions undertaken for the reduction of the impact on the natural and social environment. The Model has been calibrated thanks to the suggestions received by some dam owners suitably involved during the development process.

The actions taken into account are organised in three macro-fields:

- Environmental management actions: e.g. reforestation, fauna protection and valorisation, erosion control, settlement relocation, transfer and conservation of significant artefacts, environmental monitoring procedures, landscape impact reduction, purification systems, water quality monitoring procedure;
- Actions addressed to the promotion of local development: e.g. organisation of visits at the dam, natural oasis, lake fishing, outdoor sports facilities, accommodation,

- renovation of traditional peasant houses, construction of ecological museums, remaking and improvement of trekking paths, touristic navigation of the lakes;
- Transfer of water and money resources to the territory: e.g. regime of releases (minimum vital outflow, water releases for irrigation in case of droughts, regulation of seasonal flows), voluntary extra-fees, creation of ad hoc budgets for environmental management.
- In general terms, it should be noted that the main aim of the model is not just to rank dam owners on the basis of the quality/pro-activity of the initiatives undertaken. The objectives are rather to analyse:
- How the different typologies of actions are geographically (within the national territory, in terms of homogenous economic and social areas) and sectorial (hydropower, irrigation, and water supply) distributed;
 - To what extent certain typologies of actions tend to be conjointly implemented;
 - The investments of the various companies in certain domains of action.

3 The assessment of dam owners’ pro-activity: synthesis of results

The questionnaire described above has been proposed so far by the ITCOLD Working Group to a large number of dam owners: it has been filled in by 17 owners for 56 dams that represent more than 10% of the total number of Italian large dams. Figure 1 shows the list of companies that participated in the survey. The list of the dam owners according to the water uses is shown in Figure 2.

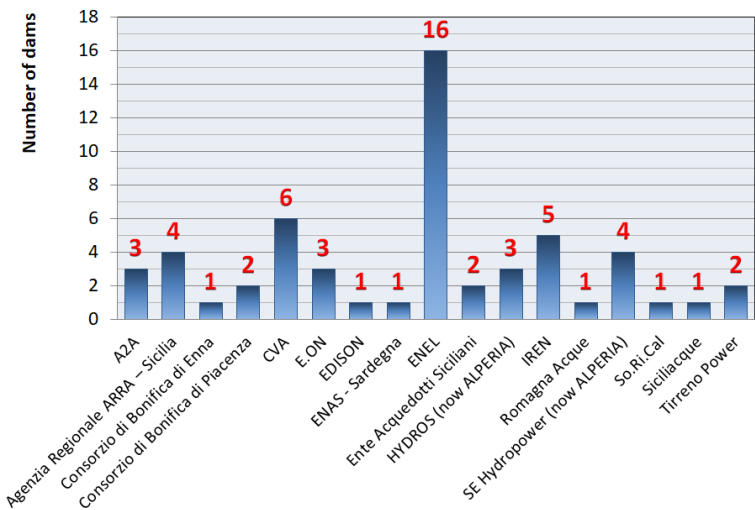


Fig. 1. List of the 17 companies that participated in the survey.

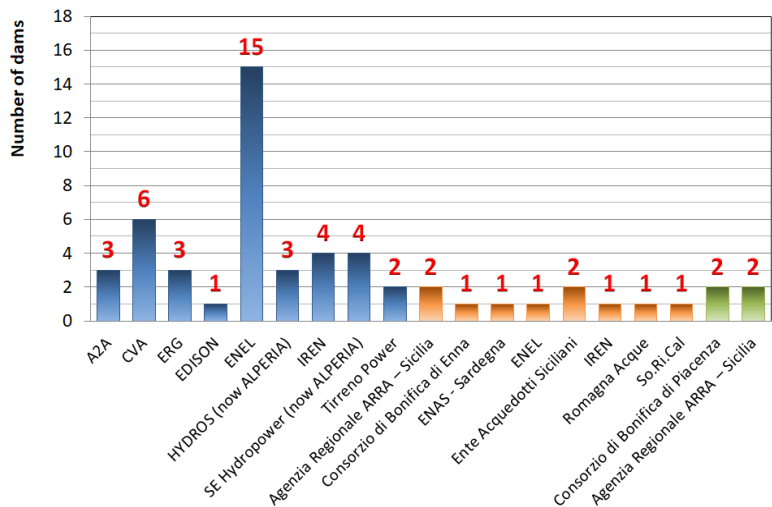


Fig. 2. List of the 17 companies according to the main water uses (blue→hydropower; orange→irrigation; green→drinkable water supply).

Figure 3 shows the position on the Italian territory of the dams analysed in the enquiry (in red the dams whose main purpose is hydropower production; in yellow the dams devoted to drinkable water supply and/or irrigation).



Fig. 3. Position on the Italian territory of the dams analysed in the enquiry.

It is worthwhile mentioning the complementary uses of the dams analysed in the survey. In addition to the main use, almost all dams have at least a secondary use as shown in Figure 4 that shows the complementary purposes of dams whose main aim is hydropower and, conversely, the complementary purposes of dams whose main aim is water supply or irrigation.

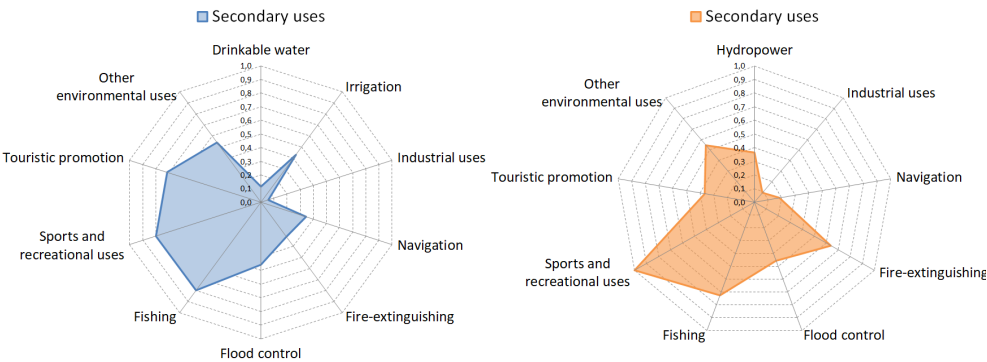


Fig. 4. Secondary uses of dams whose main aim is hydropower (left) and of dams whose main aim is drinkable water supply or irrigation (right).

Figures 5 to 10 summarize the main results of the enquiry. Figure 5 and Figure 6 show the dam owners’ actions concerning the Environmental Management implemented at the dam site.

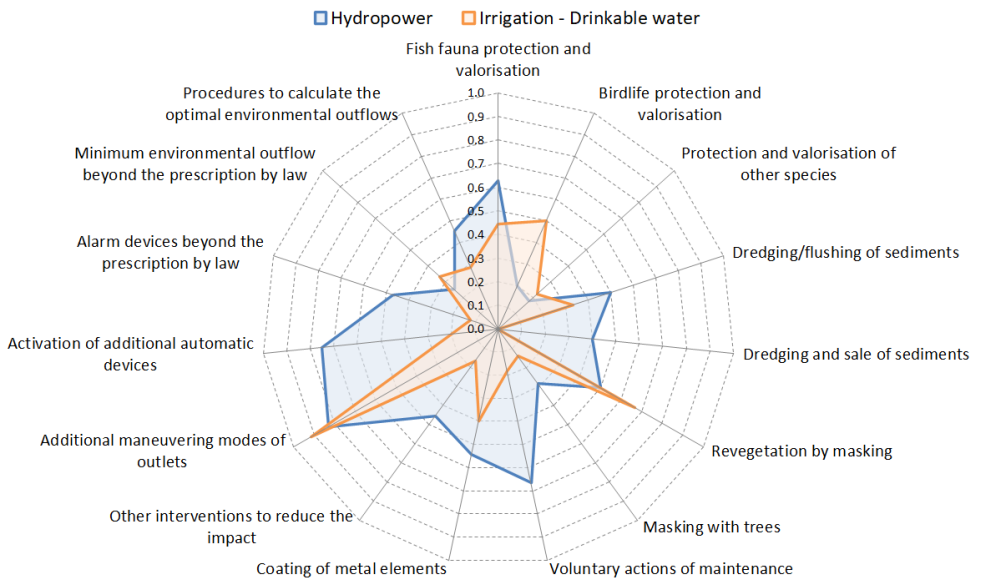


Fig. 5. Dam owners’ actions concerning the Environmental Management implemented at the dam site (blue→hydropower owners; orange→drinkable water supply/irrigation owners): environmental actions mainly associated with the protection of fauna, dredging, reducing the environmental impact, minimizing secondary risks and additional outflows to what is due under law.

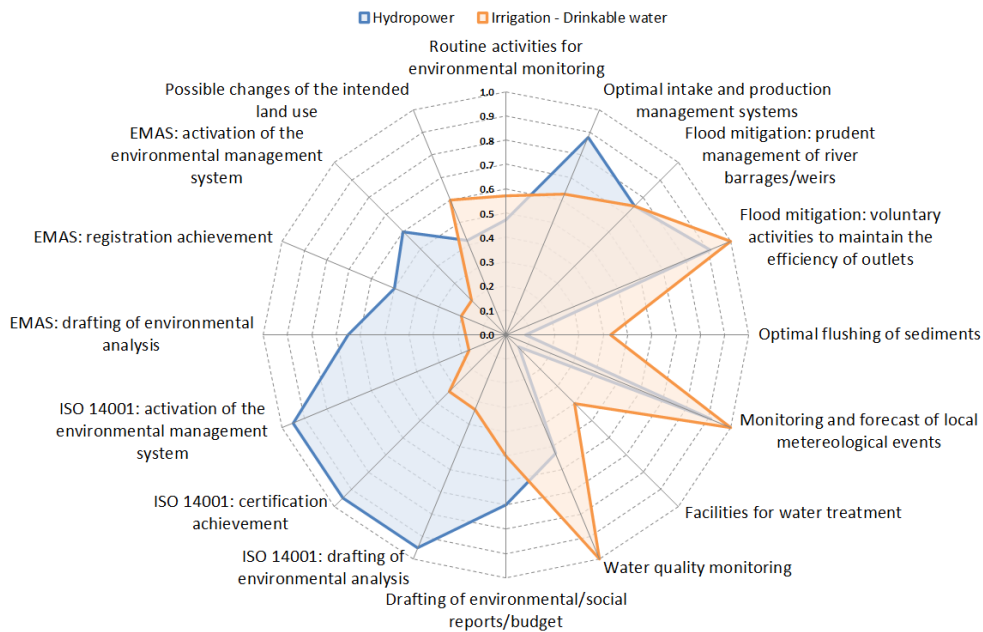


Fig. 6. Dam owners’ actions concerning the Environmental Management implemented at the dam site (blue→hydropower owners; orange→drinkable water supply/irrigation owners): environmental actions mainly associated with flood lamination, water quality monitoring, environmental certifications.

Figure 7 and Figure 8 summarizes the dam owners’ actions concerning the economic promotion of the territories where the dams are located, and the actions undertaken to facilitate the communication with the different stakeholders at large.

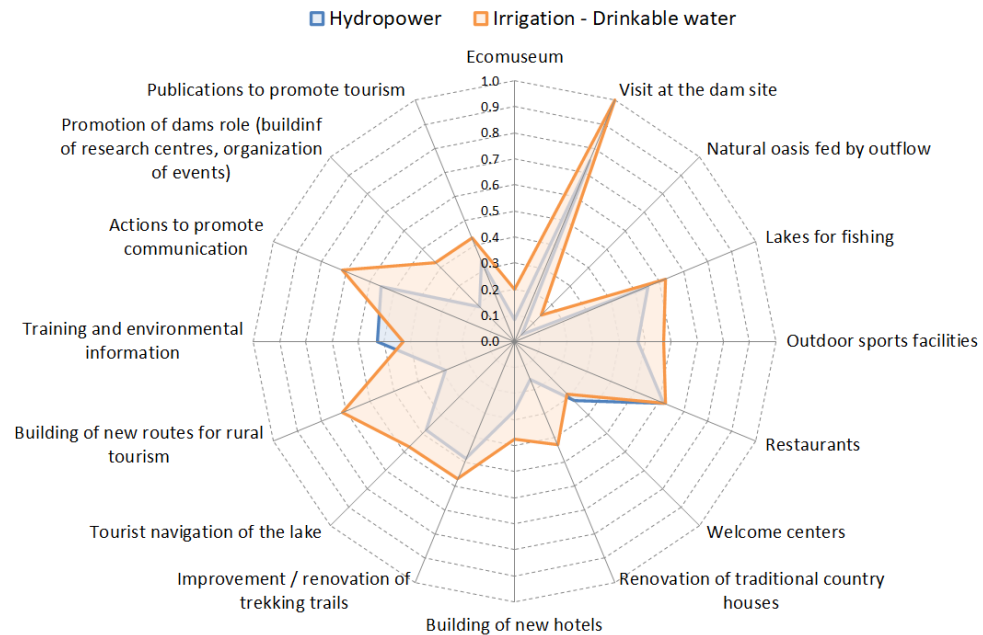


Fig. 7. Dam owners’ actions concerning the economic promotion of the territories where the dams are located (blue→hydropower owners; orange→drinkable water supply/irrigation owners).

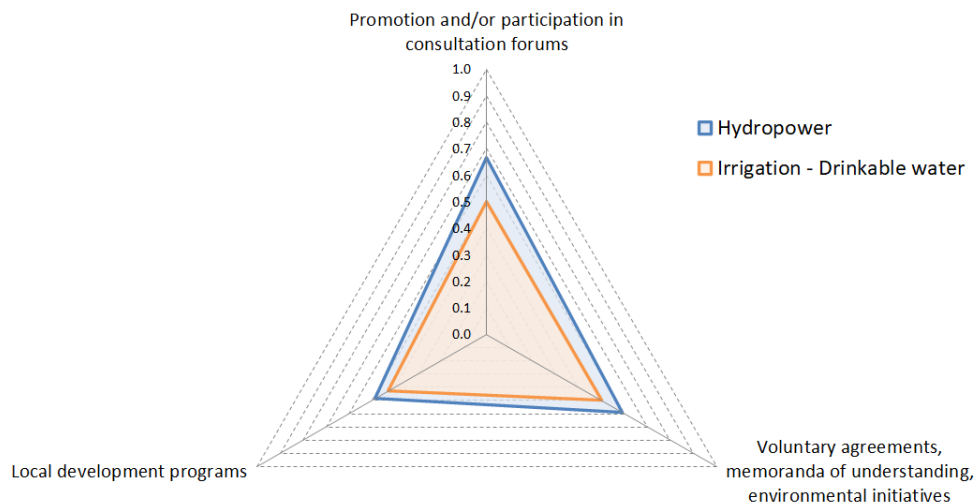


Fig. 8. Dam owners’ actions concerning the communication with stakeholders (blue→hydropower owners; orange→drinkable water supply/irrigation owners).

The results concerning the Transfer of Economic Resources towards the host territory are presented in Figure 9 that gathers the information related to different forms of voluntary contributions: water releases (i.e. additional to those required by law), economic resources to compensate negative externalities, sponsorship of stakeholders’ initiatives.

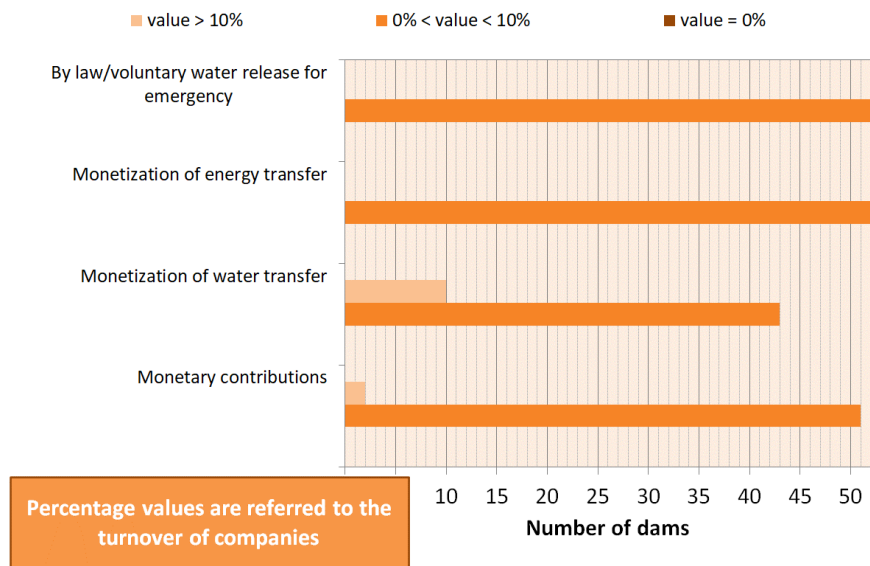


Fig. 9. Transfer of Economic Resources towards the host territories.

3.1 Comments on results gathered by Dam Owners' model

Some preliminary results related to the application of the Dam Owners' model has been presented during the 10th ICOLD European Club Symposium held in Antalya (Turkey) on October 2016 [7].

The enquiry proposed by ITCOLD has involved the participation of a significant number of dam owners. Their involvement is coherent with the distribution of the large Italian dams on the territory according to their main purpose: it mainly concerns hydropower dams in the northern regions while in the southern areas (in particular, in the main Italian islands) it refers above all to drinkable water supply and irrigation dams.

With reference to the Environmental Management, there are differences but also similarities between the actions that have been primarily undertaken by hydropower dam owners and drinkable water supply and irrigation dam owners:

- Figure 5 shows that managers of hydropower dams pay particular attention to automation of safety systems.
- Fig 6 shows the attention paid by drinkable water supply and irrigation dam owners to guarantee water quality while the hydropower dam owners are particularly attentive to environmental certifications (i.e. ISO 9001 and EMAS).
- Fig. 7 and Fig. 8 put into evidence an almost complete overlapping of the actions undertaken by the two categories of dam owners concerning the economic promotion of the territories where the dams are located (i.e. reforestation, fauna protection and valorisation, reduction of dam impact on the landscape, water releases in addition to regulatory requirements).

The main actions performed by the two categories of dam owners in the frame of the Promotion of local development are mainly relate to:

- Environmental information initiatives and agreements with local stakeholders.
- Visit at the dam site.
- Sports activities (i.e. fishing, trekking, etc.).

As expected, a good level of homogeneity exists in the answers given by the different dam owners: for both owners' typologies it is evident the attention paid to establish a positive relation with the host territories for the cases analyzed in the enquiry.

Less homogeneous are the actions related to the Economic Resources Transfer (see Fig. 9). As a matter of fact, while the Voluntary Monetary Transfers to compensate negative externalities are extremely low, the Voluntary Water Releases additional to Minimum Vital Flow and the Voluntary Monetary Transfer to support environmental initiatives (WWF, oasis, etc.) have been basically carried out only by hydropower dam owners. This fact is not surprising considering that hydropower remains a good source of income in spite of the recent changes in the energy market in Europe, while systems devoted to water supply and irrigation in Italy are not in general managed in terms of economic goods that have to make profit.

4 The point of view of stakeholders

The Dam Owners' Model is largely based on a self-assessment that have to be somehow counterbalanced by a "parallel" evaluation of the stakeholders' point of view about the dam owners' pro-activity and the role of dams on social, economic and environmental aspects. To reach the goal, it was deemed effective making reference to a direct measure of Stakeholders' view assessed thanks to the organization of Workshops in areas of the Italian territories where the Dam Owners' Model was applied.

So far, six Workshops have been organized by ITCOLD. The first was held on May 2014 in Bolzano Province (North of Italy) characterized by the presence of many dams mainly devoted to hydropower. The second Workshop was held on October 2015 in Calabria

(Southern Italy), a Region characterized by a large number of dams devoted both to hydropower as well as to water supply and irrigation. The third workshop was organized on October 2016 in Bologna (centre-north of Italy) characterized by a mix of dam destinations influenced by the economic characteristics of the territories. The fourth workshop was held on October 2017 in Rieti (Lazio region, centre of Italy), with a territory similar to previous one. The fifth workshop was held on October 2018 in Genova, Liguria region, in an area dams can play a major role to mitigate the meteorological effects caused by climate change. The sixth workshop was held on October 2019 in Palermo, Sicily, a region affected by water scarcity. Figure 10 shows the location of the cities that have hosted the 6 workshops held so far.



Fig. 10. Locations of the six Workshops organized by ITCOLD

The views of stakeholders are obviously influenced by the local socio-economic and environmental context; therefore, it is not easy to make a homogeneous synthesis of the information collected. Below is a summary of the common elements of greatest interest that emerged during the 6 workshops held so far:

- Activation of continuous discussions at institutional level between dam owners and stakeholders to minimize the negative effects related to the presence of dams, identify improvement actions and any forms of compensation for negative externalities.
- Management of water resources, also relating them to the development of the local economy.
- Review the regulatory constraints - in some cases too restrictive - to favour the targeted creation of new reservoirs to support local economic development.
- Greater attention to the monitoring of the water body: transition from the concept of minimum vital flow to ecological flow.
- Greater attention to the phenomena of hydropeaking and thermopeaking.
- Greater attention to the role of dams for the mitigation of extreme phenomena (floods and / or water deficits) linked to weather events and climate change.
- Activation of integrative uses where not present (use of reservoirs to fight fires, recreational activities, creation of natural oases, etc.).
- Review the choices made with regard to mini hydro which did not bring the expected positive results (in particular due to the strong limits in terms of environmental quality).

5 Final remarks

The inquiry carried out by the ITCOLD Working Group surely presents some shortcomings: it has been carried out for about the 10% of the Italian large dams that in terms of sample could be considered statistically representative; however, the dams analysed in the inquiry have been chosen by dam owners among those in which the relationship with the host territory could be more positive. Nevertheless, this is the very first time that a similar survey has been carried out in Italy and the picture that emerges from the enquiry shows a significant number of pro-active dam owners. At any rate, the results of the inquiry provide a fairly complete picture of the state-of-the-art of the relation between dam owners and stakeholders in Italy and may constitute a benchmark for those stakeholders who wish to assess their own proactivity. The other side of the coin is represented by the assessment of the stakeholders' perception about the positive and negative effects of dams on the host territories.

In the next future ITCOLD is strongly determined to continue in the organization of Workshops in other areas of the Italian territory to widen the views of the stakeholders' perception in order to counterbalance by a "parallel" perspective the evaluation of the dam owners' pro-activity. The results of the enquiries will provide indications on the trends in dam management, on the statistical distribution of best and innovative practices, and on the stakeholders' perception about the role of dams and the proactivity of dam owners. The huge effort of ITCOLD will hopefully contribute to overcome prejudices on the role of dams and to facilitate the dialogue between different views and interests.

The ITCOLD Working Group members are confident that the experience described in the paper could be profitably applied to other European context that are characterized by social, economic and environmental contexts similar to those of Italy. The results of these experiences could favour a vision of the role of dams in the European socio-economic and environmental context free from prejudices and points of view that do not correspond to reality.

6 Acknowledgements

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