

The False Charm of Small Hydro-power. Impacts and Risks related to the Proliferation of "Green Energies" on Alpine rivers

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Abstract

In the next years, the building of 2.000 new small hydro-power plants for the production of "green energy" in the Alps is foreseen by ESHA - the European Small Hydropower Association. In many cases their construction can lead to permanent degradation of important aquatic ecosystems. Because of the present day European policies aimed to promote the development of "clean" energies at all costs, Alpine rivers and streams may pay a too high price on the altar of "development". To build post-development scenarios, de-growth strategies have to consider alternative approaches to reduce the excessive proliferation of mini-hydro on fragile water ecosystems. Therefore it is necessary to analyse each small hydro-power project in a multidisciplinary perspective, to assess the real economic benefit of these plants as well as their cumulative impacts.

Energies really "clean"? The new rhetoric of a model of "development at all costs"

The Alps are renown for their intrinsic, rare beauty linked to lakes, rivers and streams. However even the Dolomites, today listed in the World Heritage List of UNESCO for their fragile and unique environment, are in danger of losing an important component of this beauty: water. Because of the euphoric general atmosphere for the development of renewable energies and, in particular, of the latest generation of hydroelectric energy, the so-called "mini-hydro", water is more and more a contended resource in the Alps .

After the last decades characterized by massive exploitation of polluting energies like oil and coal, the development of renewable energies as possible solution to a changing climate, certainly represents a good perspective for our Planet.

However, only few experts and researchers know the substantial consequences that some "clean" energies may have on fragile and sensitive areas, such as the Alpine aquatic ecosystems.

Alpine rivers and streams with good/high quality status are becoming increasingly rare after the last 50 years of development of hydro-power industries: today the risk is that the mini-hydro proliferation (an innovative technology publicized with "zero impact" on the environment) may cause further cumulative impacts on sensitive and fragile aquatic ecosystems. Indeed, if not guided by principles of "integrated sustainability", even the most innovative technologies do represent an ambiguous kind of "development".

Today it is worth noticing that not the usual environmental groups, but the industrial associations of manufacturers proclaim the most effective (one-way) benefits of "clean" energies such as the mini-hydro, and promote their indiscriminate construction almost everywhere. With clever communication strategies they emphasize only the advantages of the mini-hydro technology and, very often, without considering at all the intrinsic fragility of Alpine streams and aquatic environment. Confronted with manufacturers' attitude to make easy profits, even the public institutions (municipalities, mountain councils, etc) that in principle should pursue the objectives set by European legislation to protect the integrity of rivers and to reach their "good ecological status" (GES), are sadly becoming quite rare, especially in the southern part of the Alps.

Two main European Directives have to be considered to understand what is at stake to meet the growing demands of energy and the legitimate request to protect and safeguard unique Alpine environments. On the one hand, the European Water Framework Directive 2000/60 requires for its correct implementation great attention both to the chemical, biological and hydro-morphological quality of Alpine water; on the other there is, in apparent opposition, the European Directive on Renewable Energies (2009/28).

How to make the European Water Framework Directive 2000/60 compatible with the development of green energies that are not always as "clean" and sustainable as it is claimed by manufacturers?

It is certainly a difficult subject to deal with, because of the big economic interests linked to the energy industry. But in order to better understand the causes and the possible solutions of these small but significant "water wars" in the Alpine region, it is certainly worth to know the position of some scholars and experts. Two recent international conferences may help to reconstruct the matter.

Eco-funding of the mini-hydro increases environmental impacts

The Third International Conference on Water in the Alps, organized by the Italian Ministry of the Environment and by the Alpine Convention, was held in Venice in November 2010. It has been an important opportunity for institutions, experts, researchers and stakeholders coming from different Alpine regions to meet and compare different approaches.

During the conference, the goals of the European Water Framework Directive 2000/60, and in particular the achievement of water bodies' "good ecological status", were compared with those of the Directive 2009/28 (Renewable Energy). Hydro-power is undoubtedly the common denominator of these two Directives.

Several contributions stressed that the mini-hydro is a very promising industrial sector for production of "green energy" – a production in line with the goals that the European Directive on Renewable Energies 2009/28 has set. Italy, thanks to the economic incentives allocated by the government for renewable energies, is at present the country where the most significant investments in the mini-hydro sector are registered. As such, it is worth to make a more detailed analysis of this case study.

In June 2010 Italy presented the *National Action Plan for Renewable Energies*. It is planned that during the next years the production of the mini-hydro sector will mark a sharp increase, while the large-hydro production will decrease in proportion. At the same time, it is expected that the total production of energy set from the hydroelectric sector will register the same values as today.

These expected changes in energy production from different power plants and the related impacts can not ignore, on the other hand, a more comprehensive water policy, as defined in the Italian *River Basin Management Plan* (also drawn up in 2010). This plan deals with protection of water from a quantitative and qualitative point of view, both for the achievement of the "water balance" and for the release of the "minimum vital flow" in each river basin.

These two national plans have to meet both the environmental objectives of the 2000/60 and the important goal enshrined by the Directive 2009/28: the energy produced in Italy has to come increasingly from renewable sources (at least 17% by 2020).

In this context, it is not surprising that a group of economists of the Bocconi University, including Andrea Massarutto and Alessandro de Carli, is stressing the fact that the threat of large proliferation of these plants is directly related to the perverse effects of governmental eco-incentives. With the creation of a "doped market", today it becomes possible to build mini-hydro plants also in those river segments where, in the past, it never would have been considered. Therefore, it seems fundamental to plan more carefully some future energy policies. The analysis of the real economic benefits of these mini-

hydro plants can not be calculated correctly without an economic assessment of environmental impacts.

Also, if we do consider that the spectre of climate change and a growing water scarcity are today affecting mostly the southern part of the Alps (the Italian side), it seems fundamental to plan more carefully future energy policies.

An other conference held in Trento in January 2011, organized by the Province of Trento in cooperation with the Provincial Agency for the Environment Protection and the Centro Internazionale Civiltà dell'Acqua, addressed the potential impact of mini hydro technologies on the Alpine environment. Several issues and questions were raised during the conference

(http://www.appa.provincia.tn.it/agenda_eventi_ambientali/pagina250.html). Indeed if among the "costs" of mini-hydro we include also the environmental ones, when does it become economically convenient to build a single mini-hydro on an Alpine river? Can the "ecosystem services" rendered by rivers (self-depurative power of water, production of goods and services, fisheries, tourism, etc) compete with the mere economic incomes of this industrial sector? When is it acceptable to build these plants into rivers that have the highest indices of biodiversity? And what certification tools exist today to protect consumers who want to buy authentic "green energies"?

The Trento conference analysed the causes of the indiscriminate proliferation of mini-hydropower in many Alpine regions. The proliferation of these plants is linked, in Italy more than elsewhere, to the desperate research of economic funding by local Municipalities, today in crisis because of the very limited available finances and, therefore, not interested in the preservation of their natural and cultural heritage.

An eloquent sign of what is going on in the Italian Alps may be seen also in the project to build a mini-hydro to exploit the residual water even in the Vajont dam: the dam sadly renown since in October 1963 more than 2.000 people were killed because of the collapse of an entire mountain in the artificial basin. This project may be considered even as a clear act of contempt towards the victims of the more famous tragedies in the history of hydro-power.

The Vajont case teaches that misjudgements in the choice of where to build hydroelectric plants, even if supported by the most daring engineering projects, can be devastating. A period of 50 years after the tragedy is enough to forget the human mistakes at the origin of this tragedy, again in the name of a "development at all costs"?

According to ESHA's forecasts (the European Small Hydropower Association that brings together the leading producers of mini-hydro plants), in the coming years about 2.000 new plants will be built in the Alps and the majority of them will interest Italy.

However it is curious to notice that, according to experts, the contribution which can be generated from mini-hydro to reach the EU target (17% of renewable energies by 2017) is not really significant. Indeed today the 90% of the hydroelectric plants in the Alps produces only the 10% of the total hydro-power amount. In other words, the 90% of hydro-power energy is produced by few, large plants.

Since the production capacity of mini-hydro is structurally limited, it is evident that their potential contribution to the 2017 goal is definitely residual.

This means that in front of a proliferation in the number of mini-hydro, the real productivity of these "clean energies" is not significant to reach the 17% target. On the other hand, the environmental impact of mini-hydro will be considerable for many rivers that are already "under stress".

In this context, some speakers stressed how it may be even more strategic to invest in the restoration of large plants that already exist, and that today unfortunately are not productive as they should be.

The certification of “clean” energies and the calculation of the cumulative impacts

The certification of large hydro-power (the old generation power plants) is a crucial issue to think about a more balanced and sustainable dissemination of the mini-hydro. To support this approach is Bruno Boz, a member of CIRF (the Italian Centre for River Restoration), engaged in the European project CH2OICE (Certification for Hydro: Improving Clean Energy, see www.ch2oice.eu). This project aims to test new “green” certifying methods for the large hydroelectric sector, in order to meet the most demanding customers in terms of environment respect. In Switzerland, for example, it has been developed a certification system that guarantees a real minor impact for Alpine rivers. Consumers who want to buy this green energy do pay voluntarily a little more their energy, with the aim to guarantee environmental protection.

The concept of "cumulative impact" illustrates well another key aspect of the particular condition of vulnerability of many alpine rivers. In fact, even if the environmental impact of a single mini-hydro plant cannot be considerable in itself, but only in addition to the sum of all human impacts on a river basin: in other word, the methods to calculate cumulative impacts are crucial to assess the actual extent of the impact of additional elements, such as mini-hydro.

This issue is quite relevant, if we consider that in Italy there is not yet a legal instrument that obliges the licensing authority to think “from a river basin perspective” (from the source to the mouth of a river, as required by the European Water Framework Directive 2000/60), instead of considering only impacts on specific segments of a river.

Also, clear and transparent criteria that allow the new authorization of a specific plant rather than another, are still missing in Italy, with significant differences between region and region.

As pointed out by Andrea Mammoliti Mochet (ARPA Val d'Aosta), an interesting and innovative solution to the tricky issue of "where to build mini-hydro?" can be provided by rigorous exercises of mapping rivers. With a specific methodical approach, some places can be assessed more "suitable" for mini-hydro, and these can be the ones where a relative greater amount of energy meets a lower environmental impact.

To develop such a new methodical approach is the goal of the European Project SHARE (*Sustainable Hydropower in Alpine Rivers Ecosystems*). The project (www.sharealpinerivers.eu), led by ARPA Val D'Aosta, offers a rigorous scientific basis to "mediate" the conflicting interests among different subjects and stakeholders, while considering both the Water Framework Directive and the Directive on Renewable Sources.

Public participation versus technocratic approaches

The proliferation of mini-hydro plants inside some Italian national parks (including the Alpine Dolomites and the Apennines) is a big matter of discussion for citizens and environmental movements. Is it correct that similar plants are certificated as "green" exactly because they are built inside a protected natural park? How is it possible to set a limit in the number of mini-hydro not to turn these areas of true natural value into promising industrial valleys for production of “green” energies?

In line with the goals to increase public participation in the management of river basins set by the Water Directive 2000/60, today it deems necessary more than ever to promote participatory approaches where citizens' representatives can meet and discuss with local authorities, manufacturers and other stakeholders.

A paradigmatic case of civil society's genuine public participation, is the one of Craveggia and Onsernone, two small Alpine communities between Italy and Switzerland. At the end of the Trento conference, this was brought to public attention with the 3rd International Award “Civiltà dell'Acqua” conferred to the Municipalities of Craveggia (Verbania. Italy) and

Onsernone (Ticino, Switzerland), as well as to the civil society movement "The Isorno: threatened river - the troubled waters of Bagni di Craveggia" (www.civiltacqua.org).

These two communities during the last ten years have literally fought against the construction of a small hydroelectric plant: a plant that would have damaged irreparably the very centre of these towns and the historic thermal spring of Bagni di Craveggia. The Award was conferred to highlight a standing example of local communities becoming fully aware of their cultural and natural heritage. With the construction of the plant, the disfigurement caused to the river would have been irreversible and also disproportionate, compared to the "mitigation" measures offered by the manufacturers (about 100,000 €/year for each Municipality). Perhaps the case of Isorno will get future international recognition for the coordinated efforts of genuine civil movements to stop external projects to the community as well as to build a "New Culture of the River".

Towards a sustainable hydro-power production

Looking at the Italian case, the ongoing proliferation of small hydro-power leaves too many questions unanswered *vis à vis* the need to build post-development scenarios and de-growth strategies.

What are the assessment criteria set by the local public authorities to grant new authorizations for new mini-hydro? How do these authorities decide for or against a specific mini-hydro project? Competing projects are considered only for their maximum economic profit, or even comparing the respective environmental impacts as well as their cumulative effects? What planning tools are implemented at the institutional level to carry out a rigorous cumulative impact assessment?

Nowadays it is hard to understand what evaluation criteria are taken to assess the potential impact of the mini-hydro proliferation in the Italian Alps. However, such a transparency is essential not to leave the final decisions to the market dynamics.

Instead of considering single parts of a river for punctual interventions, today citizens and social movements feel the need of a greater coherence for planning new interventions at river basin level (from the spring to the delta). Also, the launch of new clean energy certification processes is needed to enhance the role of responsible consumers. The consideration of cumulative impacts, the need of a greater protection of the remaining natural water landscapes and a more targeted enhancement of valuable river areas, are the major challenges to consider for de-growth strategies in order to secure a "sustainable", lasting development of the hydroelectric sector.

For all these reasons a more strategic planning of renewable energies has to be considered as a priority, and also must take into account other possible "clean" sources, such as the solar energy. Nowadays the solar energy, according to many experts, is the more sustainable renewable energy to be implemented even in mountain regions like the Alps.

In an increasingly global and globalizing society, the future challenge is therefore to combine the quality and quantity management of water with the principles of "integrated sustainability", considering not only economic but also environmental, social and ethical principles.

This approach has to be distinguished from the emerging *Green Economy*, which in many cases is nothing more than a mere *façade* of "green washing". Today a real change in our attitudes and planning rules is necessary more than ever. A "new way of thinking" the management of rivers and of the environment has to be adopted, without excluding the rights and the expectations of future generations.