

# A wealth of water – the Tyrol's greatest asset

by Ernst Fleischhacker

**T**he Tyrol is situated in the heart of Europe in the midst of a narrow Alpine arc over which clouds repeatedly gather and precipitate. Snowy mountains, icy glaciers, gushing springs, flowing streams, wild waterfalls and crystal clear mountain lakes shape the appearance of the province. Powder snow pistes provide the basis of tourism in the winter, lush green pastures and meadows ensure food and recreation in the summer.

In all its aggregate conditions water in the form of ice, snow, rain, dew, mist and clouds is the vital foundation of life and husbandry in the Tyrol. As a basic

foodstuff, a fount of energy, a recreation and tourism factor and a means of production, water is the Tyrol's only real resource. Conversely, water also constitutes a potential danger for settlement and for economic structures in the province. Destructive avalanches, landslides and flooding are thus another side of the Tyrol's water scenario.

## **Tyrolean water must be seen from a holistic viewpoint**

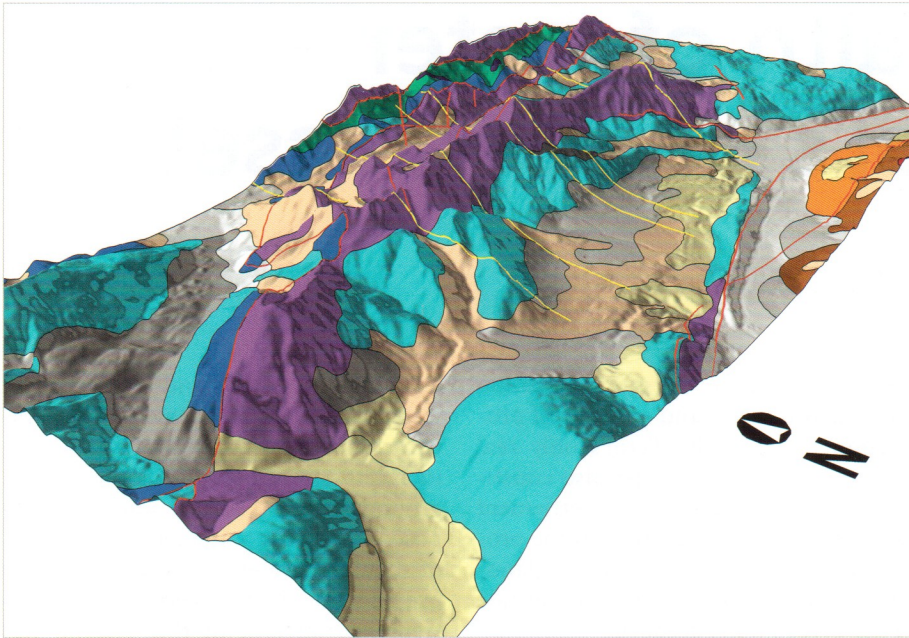
In order to grasp the significance of water in all its dimensions one must first

learn how to understand the system of water resource management. This system comprises the supply of water in all its facets – precipitations, spring water, groundwater and surface water – as opposed to water requirements in the form of drinking water and water for daily use. Meeting the requirements is the entrepreneurial task in this system. Regional water cycle management balances the needs of a commune or region with their own resources. Over and above this system is the huge global and regional hydrological cycle that continually ensures the water supply in the form of rain and snow in the Alps.

Nach Verweilen im Gebirge kommt das Wasser wieder an die Oberfläche und speist die kühlen und frischen Bäche unserer Bergtäler.  
After a stay in the mountains the water again comes to the surface and feeds the cool, fresh streams in our mountain valleys.







Niederschlagsrelief der Mieminger Kette, in dem die der Höhe nach zunehmenden Niederschlagsgradienten dargestellt sind. Dieser Niederschlag füllt Jahr für Jahr den Gebirgswasserspeicher.

Precipitation relief of the Mieminger range, showing the increasing levels. Year after year this water feeds the cool, fresh mountain water reservoirs.

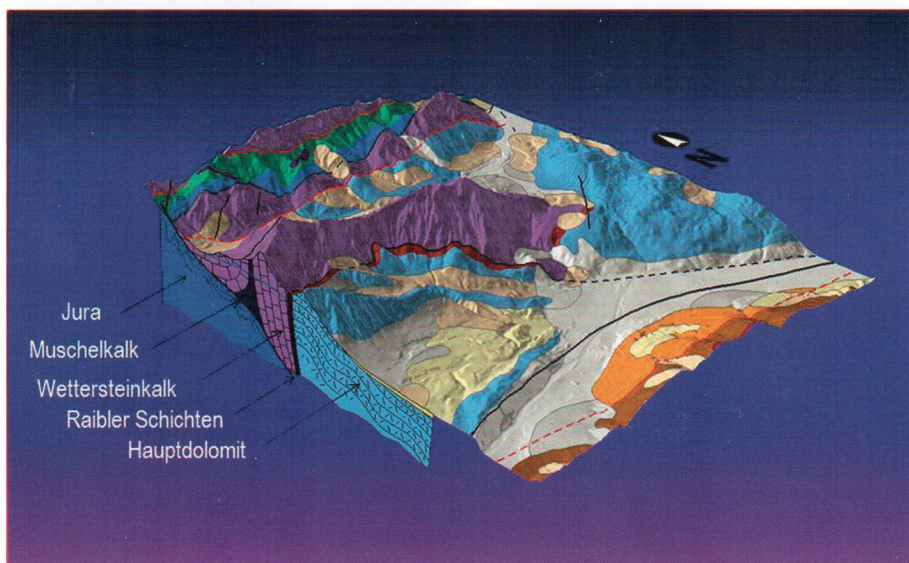
## The supply of water

Looking at precipitation levels in the Tyrol alone, it is obvious that we are among the 20% privileged on this earth, ensured of sufficient water in future, too. With average precipitations of 1.4 metres per annum we are blessed by comparison with the areas 30° north and

south of the equator where 80% of the earth's population live. In those areas the extremes range from no precipitation in the deserts to 26 metres per annum in the monsoon areas. Drought, water shortage, or permanent rainfall, hurricanes and typhoons lead, together with climate change, to conditions that are ever more extreme and to a consider-

Schnitt durch das Gebirge, das räumlich den „Gebirgswasserspeicher“ eingrenzt.

Cross section through the mountain range that spatially confines the "mountain water reservoirs".



able flow of environmental refugees, as currently experienced from Africa to Europe. In our region, however, there is no sign that precipitations are considerably changing, although in the Alps, too, melting glaciers and marked individual occurrences clearly do point to climate change.

Seen in terms of the entire area of the Tyrol, 18 billion m<sup>3</sup> of precipitations fall annually in the form of rain and snow. 13 billion m<sup>3</sup> of this amount of water run off over the surface, some 10% is absorbed in the mountains and the valleys, thus perpetually renewing our drinking water reserves in the mountain water reservoirs by 1.5 billion m<sup>3</sup> per annum and our groundwater fields by 250 million m<sup>3</sup> annually. Not infrequently the water stays in the mountains for many years and becomes enriched with valuable minerals before coming to the surface again in the form of springs. More than 10,000 springs – in the northern limestone Alps in particular these can be very big with yields of up to 1,000 l/s and more – provide the natural overflow from these mountain water reservoirs. In the first half of the 1990s and in the past decade situations like this have been researched in the area of Erl/Blaue Quelle, Kaisergebirge/Hintersteiner See and Hofingerquelle, Rofan/Jenbach/Moosquelle, Karwendel/Vomper Loch and Bollenbachquelle, Mieminger range/Stöttelbach springs, Vorderes Ötztal/Brunausprings, in the Pitztal and in the Lienz Dolomites. According to the type of rock where water is deposited in the clefts, it is enriched with calcium, magnesium, fluorine and other trace elements that are very important for the human body and for good health.

These "remineralized" drinking water resources have an inestimable value of European dimensions. What is more, the water absorbed by the plants and given off again (evapotranspiration) is the cooling aggregate of the Alps. This function is increasingly important in increasingly hot summers when people even have to flee from the beaches of southern Europe on account of the heat. Some 13 billion m<sup>3</sup> of water flow off annually in the Tyrol in the 1,700 km long, finely branching network of rivers and streams. In addition there are some 600 crystal clear mountain lakes which round off the abundance of water in the province.



From these objectively perceivable dimensions alone it is obvious that water is far more than the chemical formula  $H_2O$ . Hitherto science has not been in a position to explain all the phenomena that determine the effective value of the water supply. In Maria Waldrast in the Wipptal, for example, water can be filled from the spring into containers and stored without deteriorating. People swear by the various healing powers of this water. Masaru Emoto is a Japanese alternative physician who “proves” by means of frozen water crystals that information can be transmitted in water. From this it is deduced for our water supply that the information to be found in the primitiveness of the springs can be lost through technical facilities. Viktor Schauberger was an Austrian forester who made observations in mountain streams in the first half of the last century according to which use can be made – for example when transporting timber – of the powers inherent in water turbu-

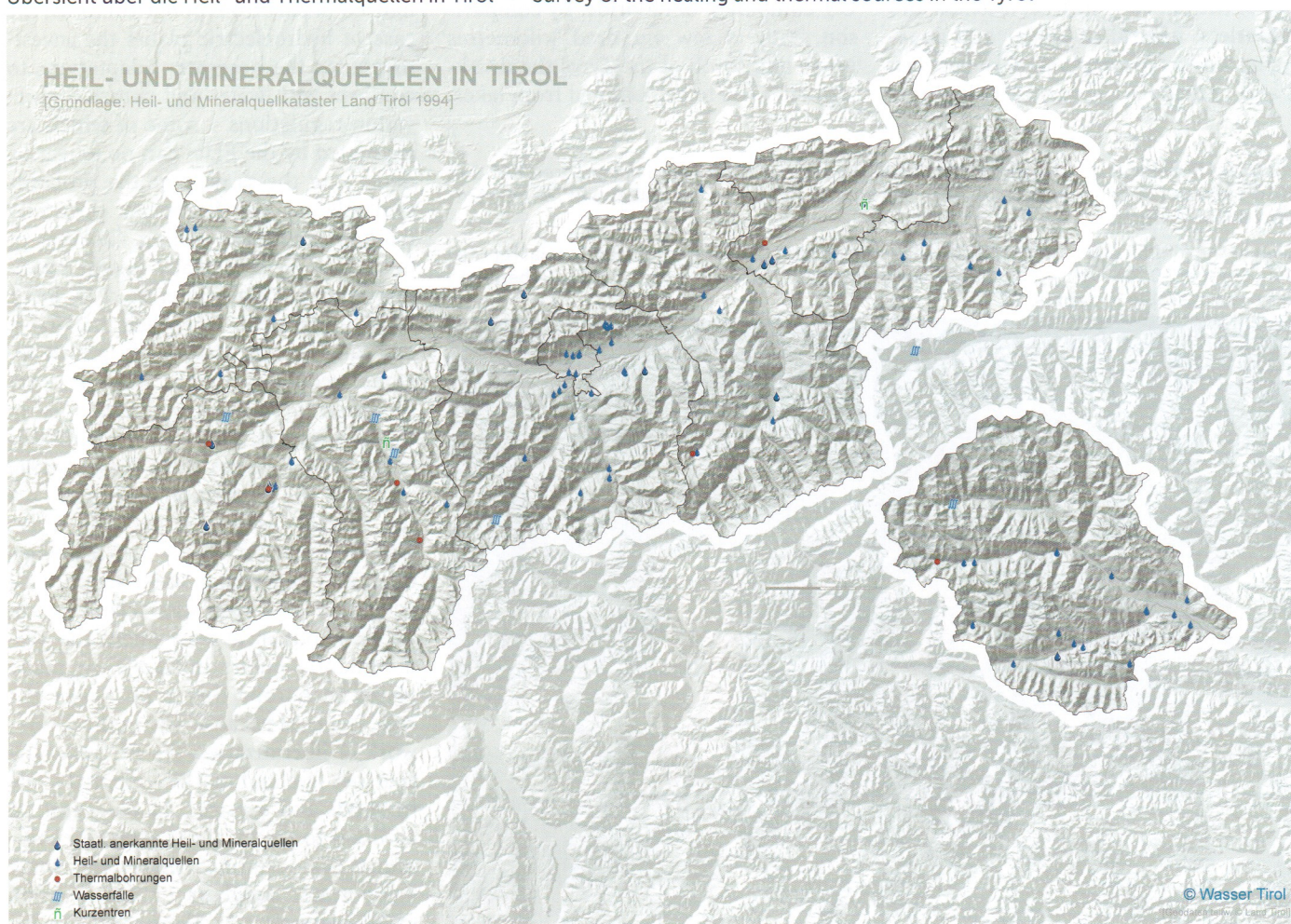
lence. Johann Grander, a Tyrolean who died in 2012, developed a method of “water revitalization”. Knowledge and methods regarded by critics as pseudo or parascientific are frequently dismissed as “esoteric nonsense”. Today, however, we are in a position by means of scientifically recognized methods to examine the particular effects of water and thus to get ever nearer to the much discussed borderline between science and esotericism.

### The need for services

Tyroleans use some 50 m<sup>3</sup> of water annually, i.e. some 36 m. m<sup>3</sup> water in all. For the main part this is water for showers, baths and washing laundry and to a lesser degree for cooking, baking and drinking (one to four litres per day). In all, however, 120 m. m<sup>3</sup> of contaminated water have to be cleaned again before they are returned to the hydrological cycle. This is due to the many tourists who

come to our province in the holiday season and to the dirty industrial and surface water that has to be cleaned in the 53 central purification plants in addition to Tyrolean household sewage. In the Tyrol the water used for subordinate purposes – e.g. washing cars – is predominantly natural spring water. Thanks to the height of the sources, waste water transport to the next purification plant can be managed at a low cost. More than 15 times the entire water requirement amount in the province seeps annually from precipitations into our water reservoirs in the mountains and valleys. The need for energy services is also for the main part covered by the resource water in the form of power stations for electricity production and geothermal heat pumps. Direct and indirect water services for sport, leisure, recreation and adventure document the variety of needs for water in the Tyrol.

Übersicht über die Heil- und Thermalquellen in Tirol • Survey of the healing and thermal sources in the Tyrol







Von Osttiroler Künstlern geschaffene Werke aus Stein und Holz säumen das Areal der Heil- und Thermalquelle in St. Jakob im Defereggental.

Works in stone and wood by East Tyrolean artists line the area of the healing and thermal source in St. Jakob im Defereggental.

### Meeting requirements

The Tyrolean drinking water that flows out of the tap is germ-free, tasteless and odourless, neutral in colour and appetizing with a tap temperature of between 5 and 15 degrees Celsius. Usually this is

natural (native) water. Only in a very few cases must the water be sterilized with UV equipment or chloride. By comparison, only a few hundred kilometres north and south of the Tyrol the drinking water has to be obtained from lakes,

Schon im Mittelalter genoss die Heilquelle in Grins bei Landeck einen besonderen Ruf. Seit 2010 steht das hochmineralisierte, über 20° warme Heilwasser im „Albenbad“ der Öffentlichkeit zur Verfügung.

Even in the Middle Ages the healing spring in Grins near Landeck enjoyed a special reputation. Since 2010 the highly mineralized, warm (over 20° C), healing water in the „Albenbad“, has been available to the public.



rivers and filtrates and artificially treated. In the Tyrol it is the local councils and communal associations who manage drinking water supplies and the purification of dirty water in the central plants and who organize the provision of the infrastructure and the running of the plants. Such services are supported financially by the federal and provincial authorities. Thus the water and sewerage rates are not generally viable prices. The danger with this form of provision lies in the fact that, due to a lack of reserves, reinvestment needs for older plants can no longer be met from public funds. Then commercially viable concerns take over or have to take over the maintenance of such plants – and thus of valuable resources. In the next ten years investment requirements for water and sewerage infrastructure will amount to ¾ billion Euro. Some 40% of this are required for the renewal of water supply plants and some 60% for the renewal of sewage farms. The situation is similar in the case of the many hydroelectric facilities, sports and recreation amenities financed in part from public funds. In the case of hydroelectric plants the investments for the necessary adaptations to conform with water and nature conservation regulations – some of which are stipulated by the EU – can no longer be made if at the same time the proceeds available on the European electricity markets are rapidly falling. Closures or take-overs by financially potent investors who are only interested in long-term investments are then inevitable and fatal for the historically grown regional economy. That is why there are recurrent privatisation discussions in this connection, some of them politically motivated. In the Tyrol these usually end with the population wishing to see the valuable resources and the infrastructure – water supply and sewerage, electricity generation, water supplies for adventure and recreation centres – in public hands or at least under the predominantly public influence. In many places in Europe this is no longer the case, not least because within the framework of liberalization the EU generally specifies free and market-oriented trade in goods and services. In the Tyrol, in addition to the local councils and communal associations, there are some 4,000 water suppliers or nearly 1,000 small hydroelectric plants that are for



the main part private or privately organized cooperatives. These “entrepreneurs” are not profit-oriented, but run the plants in order to secure their homes, companies and jobs. They are, as it were, the representatives of a traditional Tyrolean water management culture that, in the interests of the development of the province, has realized sustainability projects, some of which are highly visionary, in the interests of the economical, ecologically social balance in the regions.

### The highs and the lows are close together in water management

It is a central trademark of our tourist industry to obtain, distribute and dispose of water. In many regions of the Tyrol, as in the Zillertal, sewerage extends up to the refuge huts, ensuring clean mountain streams, catchment areas and groundwater. The groundwater in the valleys is increasingly used for agricultural, industrial and energy producing purposes. With one kW/h of hydroelectric power 4 kW hours of warmth can be obtained from the groundwater. With these techniques it is possible to make a great contribution to a CO<sub>2</sub>-free energy system. Such options in the sense of a regional economy cycle do, however, require a new culture of use: groundwater is by no means as well researched and documented as surface water. Interference in the water economy and vegetation must be observed and regulated by the water, forestry and agricultural authorities. Particular attention must be paid to the ground's potential for water reserves and to reducing the CO<sub>2</sub> emissions quickly in order to keep the global and regional water cycle systems intact.

### How do we deal with this?

Recognizing, defining and evaluating the system connections and dimensions is highly important. In our growth and market driven society that is not easy since this very awareness is sometimes in the way of the “quick success”. This has always been quite simple to organize in the Tyrol where we can cover all needs with a huge excess of valuable, naturally pure water.

In fact, there is “a source behind every church spire”, providing us almost



Tirols Bergwelt mit ihren tiefblauen Bergseen und sattgrünen Almböden wird in den immer heißer werdenden Sommern zum beliebten Ziel vieler Erholungsuchender.

With its deep blue mountain lakes and lush green pastures the Tyrol's mountain world has become a favourite destination for many people in search of recreation and relaxation.

free of charge with good, usually well mineralized, drinking water for every purpose. Available in excess, this water can even be used without hesitation for waste water drainage.

That is why – especially in the light of the privatization discussion – particular attention must be paid to ensuring that traditional structures for sustainable resource economy are not put paid to by mega trends and structures. Individual regions of the Tyrol like the Zillertal have started to help themselves in this respect. The awareness of these circumstances must be sharpened in order to

link up with a historically developed culture of sustainability which keeps entrepreneurial structures going without overtaxing the public budget. In the matter of water privatization we have seen recently in Austria how the subject of water can generate great emotion. Water is the archetype of something deep in our soul and our subconscious. In my understanding supply is represented by the ecology, requirements by the social structure and the meeting of requirements by the economy. These three elements are linked by three elastic ropes, all which must hold in every



phase of the project. With this understanding of a sustainability culture it should in future be possible to use the most valuable resource in the land for our own purposes before others do so. Many authorities, institutions and companies personify the significance that water has for the province of the Tyrol. Intensive discussions on political and legal responsibilities and competence in respect of the Alpine water supply and the best possible, sustainable management of this vital resource were first held in the 1990s on the occasion of the foundation of **Wasser Tirol**, at that time a commercial enterprise, between the provincial authority and the TIWAG provincial organisation. The latter saw to the elaboration of a Tyrolean water economy concept within the framework of which the – at that time unique – Tyrolean register of sources, the groundwater cadaster and hydrogeological research of the biggest Tyrolean sources were run. The idea of a special water company was “revitalized” in 2003 and led to the “Wasser Tirol” being refounded as “Wasserdienstleistungs-GmbH”. Since then the latter has continued the work started in the 1990s in the field of regional development, resource management and quality securing. Behind the work carried out by “Wasser Tirol” stand the research and development aspect for the entirety of water projects, the integration aspect between the private and public sector and the responsibility aspect in the particularly sensitive relationship between the regions, the communes and the people. The clients of the Tyrolean water, energy, leisure, tourism, corporate, communal and regional economy are thus provided with solutions by one and the same hand.

#### DR. ERNST FLEISCHHACKER

Born in 1955, the son of a farmer in Steinfeld an der Drau, schooling at the Meinhartshaus in Sams, graduate of the University of Innsbruck. His career took him from the international Bilfinger und Berger building concern to the Tiroler Wasserkraft in Innsbruck in order to refound the Wasser Tirol as a service GmbH. It has meanwhile become an essential component of sustainable Tyrolean resource management. As managing partner of the “FEN Sustain Systems GmbH”, Dr. Fleischhacker additionally supports strategy projects by Land Tirol, by regions, by companies and by individuals.

#### Examples in the Kaiser range and on the Mieminger Plateau

With the start of Wasser Tirol in 2003 and in continuation of the water resource research of the 1990s the exploration and securing of mountain water reservoirs in the area of the Kaiser range and the Mieminger Plateau was taken up again as part of an Austrian research network. Both these massifs are some of the (most) valuable resources of the Tyrol.

In addition to Alpine tourism and traditional alp farming and forestry the Kaiser range is the site of one of the major water occurrences in the Tyrol. Large sources such as the Hofinger Quelle which has supplied the town of Kufstein with drinking water since 1893, interesting watercourses like the Kaisertalbach and small mountain lakes are examples of this wealth of water. The Hintersteinersee is a source lake, fed by sometimes mystically appearing sources in the Kaiser range. Wasser Tirol has examined the water occurrence with regard to its vulnerability. Results showed that in the catchment area of the sources there are many factors of influence, e.g. grazing, fertilizer, effluents from huts, tracks, etc. Protection of drinking water supplies demands great tact on the part of everyone involved, in particular when it comes to finding suitable solutions that enable resource protection, agriculture and forestry, and tourism to live alongside each other.

Similarly, for the more or less untouched water regime in the Mieminger range and its major sources, new methods of hydrological exploration and presentation have been used to research and to spatially define the mountain water. The huge mountain water areas of a very high quality are in future to be protected from surface pollution and subterranean injury by tunnel constructions. As drinking water reserves they will be needed for the housing estates to the south of the river Inn – especially the Ötztal – which have less water available.

#### Exploration of sites of healing water, new health products

Another focal point of Wasser Tirol has centred on the exploration of healing water sites because these could become an essential factor in future health tour-

ism. There are many traditional accounts concerning healing waters and historic bathing places. In Längenfeld where the Aquadome Therme now stands there was a bathing site in the 16<sup>th</sup> century. Similar reports tell of the sulphur springs in Ladis and Grins in the Upper Inn Valley – again in the limelight recently – or at St. Jakob im Defergegg. On the occasion of a research project conducted by Wasser Tirol at the Krimmler Waterfalls it was for the first time possible to provide clinical evidence of the traditional beneficial effects of these waterfalls for asthma sufferers, the records of a rural doctor being used as a working hypothesis. On the basis of this knowledge new health products can be developed and impetus is provided for health tourism. Further such investigations have been held in the Ötztal and the Stubaital. The holistic resource management philosophy in this report, the research results based thereupon and the historic infrastructures, myths and legends are also the foundation for a series of regional development projects from the Tyrolean Upper Inn Valley to the East Tyrol, e.g. in **Ladis** where holidays for good health were introduced in the 19<sup>th</sup> century, in **Grins** where the healing thermal waters served Margarete Maultasch, a 14<sup>th</sup> century ruler of the Tyrol, as a healing source, in **Zams** with its water that was said to be mild, beautifying, yet violent, in **Zirl** where the waste water from the commune of Seefeld is used to generate electricity, in the **Zillertal**, in **Kramsach** and in **St. Jakob i.D.** Water thus determines the way we live, it is the Tyrol's most important resource, its value as a basic foodstuff and an economic factor is immeasurable. The further development of the Tyrolean water management culture is a constant process in the ecologically, economically and socially balanced handling of resources. The aim is to pass the systems on to posterity in an intact condition. This process is summed up by the word “sustainability”.

Bildnachweis/photographic sources:

Sämtliche Aufnahmen wurden uns freundlicherweise von der „Wasser Tirol“ zur Verfügung gestellt.

All the photographs were kindly provided by “Wasser Tirol”.